

CARMALT (W^m H.)

REPORT

OF

WILLIAM H. CARMALT, M.D.,

Commissioner of the New York State Agricultural Society,

FOR THE INVESTIGATION OF

ABORTION IN COWS.

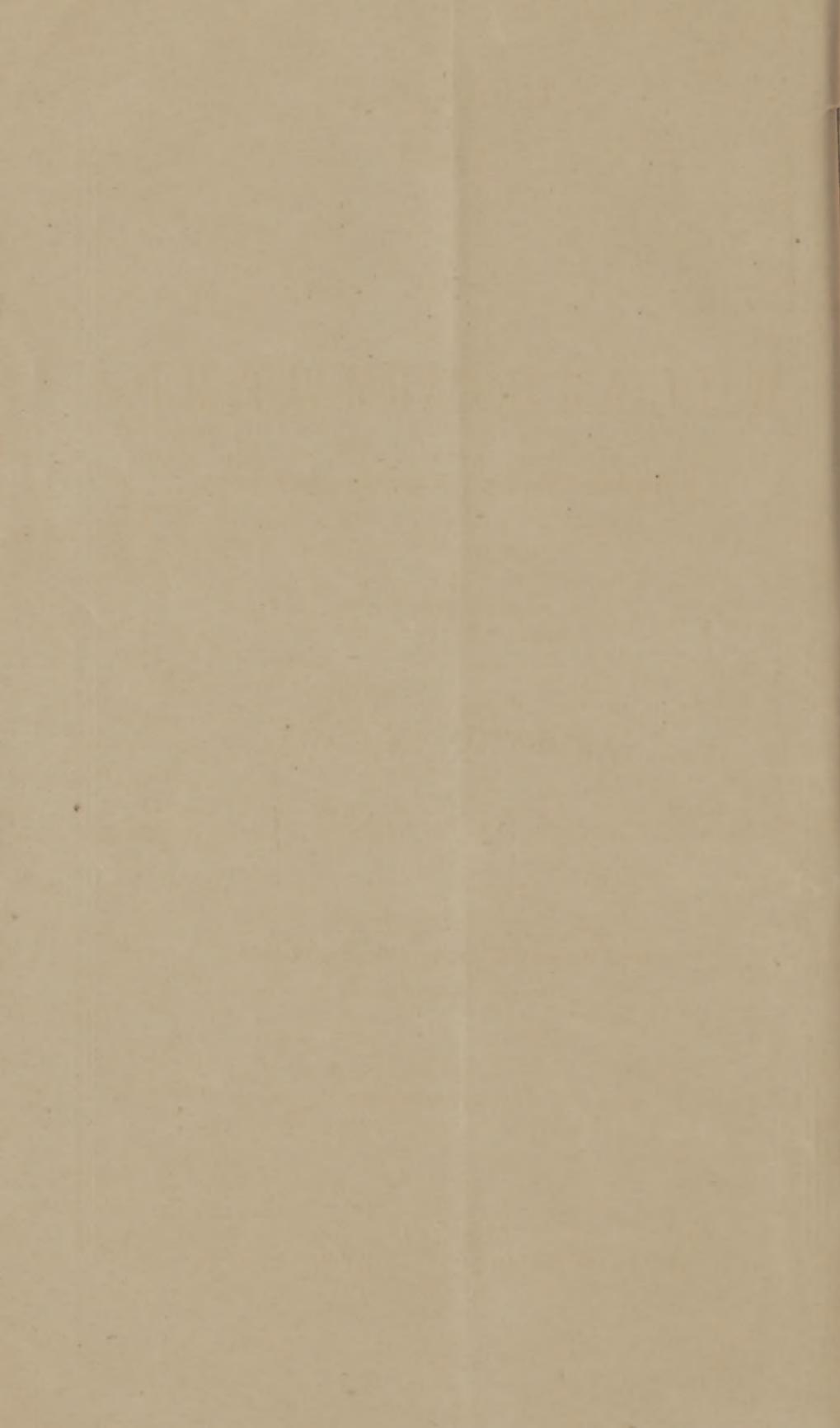
Read Before the Society February 11, 1869.

PUBLISHED BY THE SOCIETY.



ALBANY:

PRINTING HOUSE OF CHARLES VAN BENTHUISEN & SONS,
1869.



REPORT

OF

WILLIAM H. CARMALT, M.D.,

Commissioner of the New York State Agricultural Society,

FOR THE INVESTIGATION OF

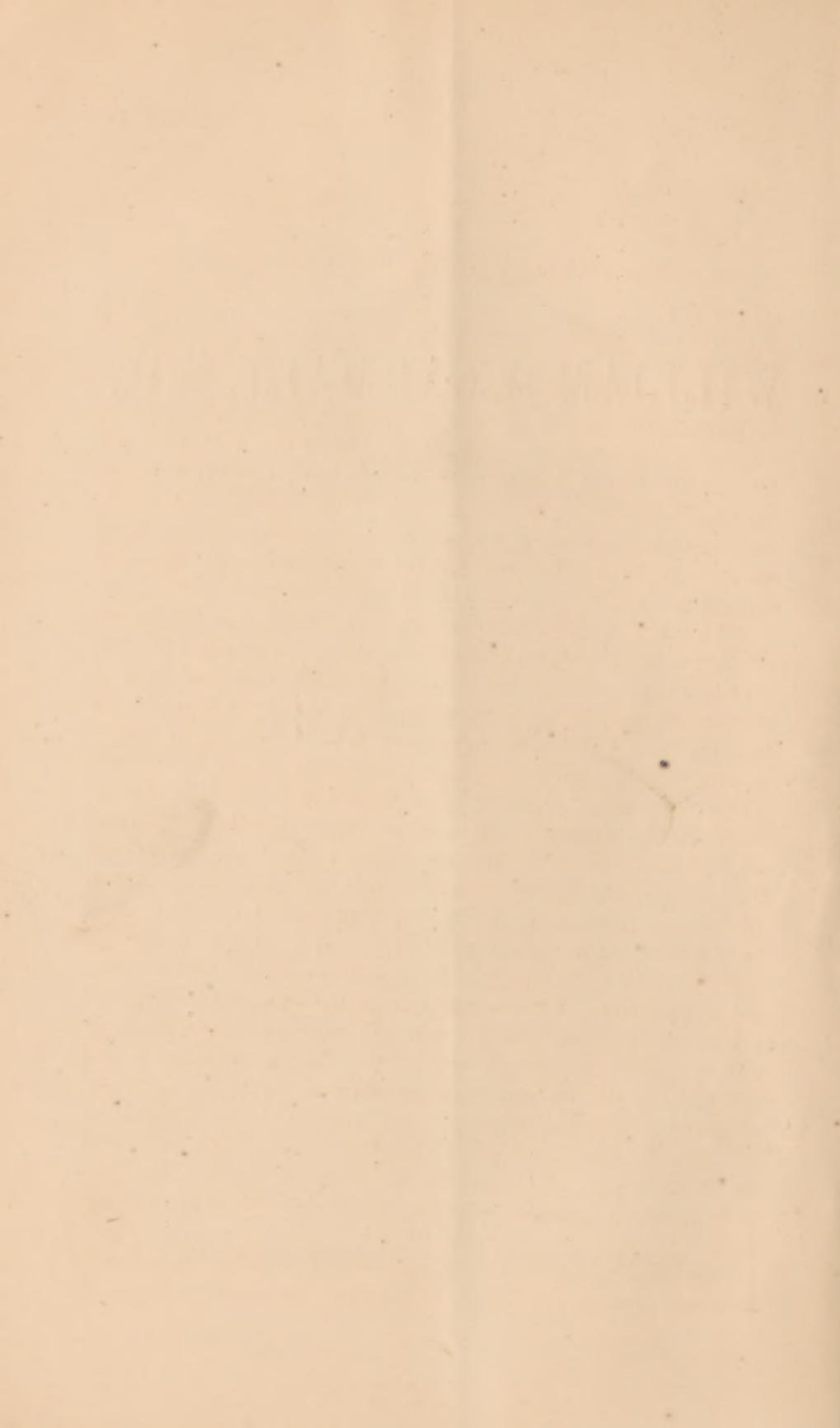
ABORTION IN COWS.

Read Before the Society February 11, 1869.

PUBLISHED BY THE SOCIETY.



ALBANY:
PRINTING HOUSE OF CHAS. VAN BENTHUYSEN & SONS.
1869.



ABORTION IN COWS.

MR. PRESIDENT AND GENTLEMEN OF THE SOCIETY:

IMMEDIATELY that notice was received, that this investigation was to be continued, the necessary steps were taken to prosecute the inquiry, in the manner demonstrated the most advisable by the experience gained last year; *i. e.*, by the appointment of properly qualified persons to inspect the farms or dairies considered desirable, and to obtain full reports thereof from the owners or occupants.

As it appeared, from the examination then made, that farms were affected indiscriminately, as regards location, and that no rule with reference to contiguity could be established; that one largely-affected dairy might be surrounded, on all sides, by those perfectly healthy, or an unaffected dairy might lie in immediate proximity to several having the disease, in other respects, all apparently subject to the same influences; it was considered desirable that as many reports as possible, of the two classes of affected and non-affected farms, should be obtained; and in order to secure this with the least possible expense, as well as that the inspection should in all cases be complete for the district examined, it was determined to have every farm reported.

As it was further apparent from that report, as well as from information received from other sources, that Herkimer county was affected to a marked degree, and yet include a large number of farms reported as having escaped the disease entirely, it was considered a favorable district, in which to institute a series of comparisons, between farms; and as it was further desirable to compare districts as well as farms, the towns of Hardwick and Barre, in Worcester county, Massachusetts, which had been partially inspected last year, were also included in the plan of operations.

The following gentlemen were appointed to make these inspections and reports, viz: Dr. R. F. HALSTED, Inspector; and Drs. N.

A. LINDLEY, BENJAMIN R. SWAN and DANIEL W. KISSAM, Assistant Inspectors. The Inspector, to receive a salary of one hundred and fifty (150) dollars per month; the Assistant Inspectors, one hundred (100) dollars per month, and both, to have their necessary traveling expenses paid.

They were furnished with the accompanying blank form of Report, marked "A," to be filled up with the replies furnished by each farmer. They received instructions, as to the manner in which their inspections should be conducted, in all essential respects, similar to the circular letter of instructions issued last year (which will be found in the Report of that year), and from time to time further directions were given to them, as circumstances seemed to render necessary.

All the farms in that part of Herkimer county lying south of the towns of Russia, Norway and Salisbury were inspected, and thus reported upon, and also the towns of Hardwick and Barre, in Massachusetts, as before mentioned.

In addition to the above general report of each farm, a botanical inspection of the town of Danube, in Herkimer county, was instituted, for the purpose of determining whether the introduction of a deleterious substance into the food of the cows, could be the cause of the trouble.

Mr. COE F. AUSTIN was appointed Botanical Inspector, and received a salary of one hundred and fifty (150) dollars per month, and his necessary traveling expenses were also paid. He received instructions as follows:

NEW YORK, July 3d, 1868.

MR. C. F. AUSTIN, *Inspector, &c. :*

SIR—You are hereby appointed an Inspector, for the New York State Agricultural Society, in the Commission to investigate the subject of abortion in cows.

As soon as possible after the receipt of this, you will please proceed to the town of Danube, in Herkimer county, in this State, and make a thorough botanical inspection of the farms therein, from a list furnished you by Inspector HALSTED, who is instructed to render you this, and such other assistance as you may, together, deem advisable for the interests of this investigation.

In your inspection, you will collect and preserve specimens of all plants found in the meadows, pastures, and among the grain of those farms;—which specimens shall be the property of the Agricultural Society. You will record, at the time, the habitat, and the percentage of frequency, for each plant in pasture, meadow and grain field, for each farm.

You will examine for any disease of the plants, whether due to the presence of a parasitical growth of any kind, or other cause; and when found, you will record the part of the plant affected;—the habitat of the diseased as compared with the

healthy plant; the percentage of disease; and, so far as you can learn from observation on the ground, the course and natural history of the disease. You are especially desired to make as careful observations and collections as possible, of all fungi upon plants—among which, Ergot, holds in connection with this investigation, a peculiar importance.

Forward specimens of every diseased plant you obtain, to the Commissioner, at as early a date after collection as practicable.

As soon as possible after making your collections, you will make out a proper classification of the specimens secured, with an account of their natural history and habits; making a complete botanical history of each farm separately.

No necessary expense is to be spared, in making your inspection as thorough as possible, so far as it may relate to the subject undergoing investigation. At the same time, you are relied upon to exercise a judicious economy in husbanding the resources of the Society, and to assist in this way the successful accomplishment of its work.

At the termination of each month of service, you will furnish to the Commissioner a report of your operations for that month, together with an account of your expenses during the same period.

Very respectfully yours,

W. H. CARMALT, M. D.,
Commissioner.

Mr. AUSTIN began his examination on July 8th, and, with the exception of a few days, continued in the field until September 18th, when he reported in person, to the Commissioner, to make up his reports. These consist of:

1st. A report, marked "B," of four hundred and forty-nine (449) plants, growing spontaneously in the town, giving, for each, its proper botanical classification and common name; its habitat, whether growing in meadows, pastures, grain-fields or woods; the estimated frequency of its occurrence; and the farms upon which each was actually found. Specimens of three hundred and sixty-six (366) of these were preserved, and afterwards carefully mounted and labelled, and, together with the reports "D" and "G," hereafter referred to, are placed in the Rooms of the Agricultural Society for reference, and in the hope that this collection may serve as a nucleus for an Herbarium of all the plants growing spontaneously in the State, should it at any time hereafter, be considered desirable for the Society to possess such an one.*

2nd. A report, marked "D," of cultivated grain raised on each farm.

* Two points of more especial interest, however, to a botanist, are the presence, in this collection, of a specimen of *Cynosurus cristatus*, or crested dog's-tail, heretofore undiscovered in this country; and of a new species of *Danthonia*, viz: *Danthonia compressa*, AUSTIN, never before described.

3rd. A report, marked "E," of the grasses affected by Ergot, (*Claviceps purpurea*, TULASNE), giving the name of each farmer; the percentage of abortion on his farm, as reported by Inspector HALSTED; the estimated percentage of frequency of the grass in the meadows; and the estimated percentage of frequency of disease on the plant. The latter, has reference to the number of heads of grass affected, not to the total amount of ergot; for, while in one plant but one or two seeds may be ergotized, in another nearly all may be affected, so that a closer estimate than the above is, obviously, impossible; together with a report, of the grasses unaffected by Ergot, giving their estimated frequency of occurrence in the meadows, for each farm.

4th. A report, marked "G," on Rust, as affecting the grasses growing spontaneously, giving the estimated percentage of the grass in the meadows, with the estimated percentage of frequency of diseased plants, to each farm.

In addition to the above, a 5th report marked "H," has been furnished, by Mr. JNO. L. RUSSELL, of Salem, Massachusetts, of the proper classification of a collection, by Mr. AUSTIN, of several species of the more common parasitical growths on the plants found.

If the cause of this trouble is to be found in the *food* of the animals affected, the offending substance would, in all probability, it is considered, be found in some of the above reports, and would also be noted as occurring only, or in greater frequency, on those farms reported to have been to a considerable degree troubled by the disease.

In examining the report "B," of those plants collected or noted as growing spontaneously in the town, with regard to the reputed influence that any may have, upon the animal system, quite a large number may be noted as having some reported medicinal qualities, but a very few can be said, to be liable to produce abortions; and none of these, without associated symptoms, to be remarked by the farmers; nor are these noted as occurring exclusively, or even in greater frequency, on the affected farms; but are recorded either indefinitely "on all farms," or on a few farms of both classes, noted together.

The number of noxious plants that may be cut and gathered in, with the hay, is of course very much smaller in number, and are probably nearly all the same varieties that would be found in the pastures; and yet, in the year 1867, out of the whole number of

1758 abortions, in which the month of the year was noted, 1571, or 89 per cent, occurred during the months of November, December, January, February and March, being those months during which the cows are stabled and fed principally on hay.

The report of 1867 shows, that the rule with regard to abortions is, that there are no marked symptoms on the part of the cow before the abortion occurs. There is no constitutional disturbance, other than should properly be referred to the fact of an approaching natural labor. There are no evidences of poisoning, either by substances irritating the alimentary canal, from which the uterus, by its proximity, may be stimulated to contraction; nor from any disturbance of the general system producing an abortion secondarily. The instances in which the cow is sick, before abortion (other than above noted), are too rare to be taken into consideration, in trying to find a cause for so extensive a malady; and all symptoms occurring after, are properly to be referred to the fact of the abortion, and not to anything beyond that.

Your Commissioner is unable to find, in the lists presented, any plant in itself healthy, which there is a reasonable probability has been the cause of this disease, affecting, as it does, so large a number of farms.

The possibility that some plants may be *diseased*, or subject to parasitical growths, and in this condition be eaten by the cows, and cause abortion, engaged the attention of the Commission; and the subject, it will be remembered, was embraced in the instructions issued to the Botanical Inspector. So far as practicable, specimens of plants so affected were collected, and were afterwards placed in the hands of Mr. CHARLES JAMES SPRAGUE, of Boston, for examination, who conferred with Mr. JOHN L. RUSSELL, of Salem, upon their proper classification. These gentlemen are the most competent authorities in the Northern United States, on this subject; and where desirable, extracts are taken from Mr. SPRAGUE's reports and letters to the Commissioner.

It was impossible for the collector to have made a complete collection of all the different fungi affecting the plants, and at the same time to have made a complete botanical examination of the district assigned him, in any one season; for, to quote Mr. SPRAGUE: "There is scarcely a phanerogamous plant which is not more or less infested. * * * The genera *Uredo*, *Aecidium*, *Puccinium*, and others, are found everywhere upon almost everything. * * * Cows could not graze where these fungi do not abound. I presume

* * * that there are at least two thousand distinct parasitic fungi on New England vegetation. The peculiar species which attack grasses are limited; but if the animals should have access to woods, glades, undergrowths, &c., they would be exposed to the effects * * * of eating hundreds of different so-called species of fungi. Many of these * * * are minute microscopic species. * * * It would be almost impossible to trace the effect of these parasites on animals eating them, because an immense quantity would be requisite to cause any effect, and the cattle would eat scores of species with every mouthful picked up."

Of the fungi affecting grasses, the one of most evident primary practical value in this investigation is Ergot (*Claviceps purpurea*, TUL.); first, by reason of its known influence upon the pregnant uterus; and secondly, because it is probably eaten in largest quantity with the hay, at the time when abortions prevail with greatest frequency; *i. e.*, during the winter.

By reference to the report on Ergot, marked "E," it is seen that this fungus was found on ten (10) different plants, of which six (6) are among the more frequent meadow or pasture grasses, and it also shows the estimated percentage of frequency, for each farm, of each grass, and the estimated percentage therein of diseased plants. By adding the grasses contained in this table, with those unaffected by ergot (in the same table), a tolerably fair estimate may be formed of the amount and proportion of this substance in the hay fed to the cows; and noting the percentage of abortion, on each farm, will show if those farms having the greatest amount of ergot are also those affected by abortions; or if those having no abortions, are also comparatively free from ergot.

Your Commissioner is unable to trace any such definite relation as there recorded, though, as the record of abortions is for the year ending April 1st, 1868, and the botanical inspection was made during the summer of 1868, the record of abortions does not cover the ergot reported. It will be necessary to know the history of the disease next year, before a positive conclusion can be arrived at on this point, though the quantity of ergot reported on *any* farm this year, is so small that it is highly improbable that it should exert any such very general influence, as the history of this disease shows it must do, if it is to be considered the principal cause of the trouble; and more so, in view of the established rule, that the ruminata require a proportionately greater quantity of almost every substance, if introduced into their stomachs, than the mono-

gastric, before a similar effect is produced on the rest of the system. Well authenticated observation shows, further, that the continued administration of ergot, in considerable quantity, is not infrequently followed by gangrene and paralysis of the extremities, or other evidences of serious poisoning. It would seem not improbable, that as usually no material change is made in the food of the cows during the winter, but that the ergot, if administered at all, is continued to be taken to the same extent until the cows are turned out to pasture, that if enough was taken to produce any considerable number of the abortions reported, that out of the 75,000 cows, and reported 4,350 abortions, passing under the notice of the Inspectors of the Society during the last two years, some one instance of this kind of trouble would have occurred, and if occurred, surely reported; but the records of the Commission are without an instance.

But a small amount of grain is raised in Danube, proportionately to the dairy products. One (1) farm reported raising rye; three (3) raised buckwheat; three (3), corn; seven (7), wheat; fifty-four (54), oats, and thirteen (13), barley, though this list must not be understood to be complete. Partly the limited time at the disposal of the Inspector in which to make an examination of the whole town, and to a certain extent an inability on his part to understand his instructions on this point, whether verbal or written, prevented so full a report on this subject as was designed; but so far as reported, and compared with the general report of the town, by Dr. R. F. HALSTED, it is as follows, viz:

The point of importance being still the food of the cows;—of one hundred and four (104) farms inspected in the town, forty (40) raised the grain from which the ground feed given to the cows was made; and sixty-four (64) did not raise it;—of the 64, on 8 the ground feed was purchased, either from mills or stores in the neighborhood, beyond which it could not be definitely traced, and of these, 5, or 62 per cent had abortions upon them; and on the other 56 no ground feed or grain at all was given, and 9, or 16 per cent had abortions upon them. Of the remaining 40, 14, or 36 per cent had abortions upon them, and of the 14, 5 were reported not to raise oats, and 11 were reported not to raise barley. The nine raising oats had "smut" (*Ustilago segetum*) to a very limited amount, a "trace" on all, and "rust" (*Puccinia graminis*) in variable proportion, from 50 per cent to "a trace" on all; while of the 26 on which no abortions occurred, 14 were reported not to raise

oats, and 22 were reported not to raise barley, leaving 12 raising oats and 4 raising barley to feed the cows, out of which 10 were affected by both rust and smut. While it is, therefore, apparent that abortions prevail to a greater extent, upon those farms where ground feed is given than upon those where it is not, the number upon which it is given is too small to base an opinion upon, were not the occurrence of these parasites so nearly uniform on both classes of affected and non-affected farms, as to justify the expression that they cannot be a probable cause of this disease there.

It would seem, then, that the substances used for food by the cattle, in this town, have been sufficiently well examined to have found anything therein that could be considered to cause so general a trouble. The pastures, woods and cultivated fields, after the grain had been cut, and the meadows, after the hay was harvested, have been gone over without finding sufficient therein to account for the trouble during the summer months, while the cows were grazing; and the standing hay and grain have been examined to determine if the offending substance could be found there, to account for the great amount of disease during the winter, but each equally without success.

The principal phenomena of this disease are sufficiently distinct, to warrant the exclusion of a substance that would cause the disease secondarily, and the only one having a direct action on the pregnant uterus, *i.e.*, Ergot (though as yet its want of influence must be considered not absolutely settled), was found in too small quantity to be considered a probable cause of so wide spread an affection; *and we are forced to a negative conclusion in endeavoring to account for the disease by reason of the introduction of a deleterious substance in the food.*

The general inspection closed December 4th, 1868;—the following is a summary of the towns inspected, the whole number of farms in each, the number of affected farms in each, and the percentage of affected farms;—showing that Fairfield has the largest percentage of affected farms, viz: 72; and Barre the lowest, viz: 7; or in Herkimer county alone, Warren has the lowest, viz: 13.

IN HERKIMER COUNTY, NEW YORK.

TOWNS.	Whole number of farms inspected.	Number of affected farms.	Per cent of affected farms.
Newport.....	105	63	60
Fairfield	97	70	72
German Flats.....	120	26	22
Herkimer.....	103	33	32
Little Falls	89	38	43
Frankfort	102	20	20
Litchfield	131	41	31
Winfield	84	26	31
Schuyler	107	33	31
Danube	104	28	27
Manheim	91	32	35
Stark	89	17	19
Warren	119	16	13
Columbia	128	21	16
	<hr/> 1469	<hr/> 464	<hr/> 33

IN WORCESTER COUNTY, MASSACHUSETTS.

Hardwick	105	24	23
Barre	119	8	7
	<hr/> 1693	<hr/> 496	<hr/> 29

These towns report cows in calf, and abortions, respectively, as follows:

TOWNS.	Total number of cows in calf.	Number of abortions.	Per cent of abortions.
Newport	2,895	361	.124
Fairfield.....	3,397	324	.095
German Flats	1,790	133	.074
Herkimer	2,582	166	.064
Little Falls	2,703	164	.06
Frankfort.....	1,299	71	.054
Litchfield.....	2,384	113	.047
Winfield.....	1,756	84	.047
Schuyler.....	2,236	100	.044
Danube	2,363	102	.043
Manheim	3,347	132	.039
Stark.....	1,711	68	.039
Warren.....	2,032	78	.038
Columbia	1,861	45	.024
	32,356	1,941	.06
Hardwick	1,240	105	.084
Barre	1,323	11	.0083
Total.....	35,919	2,057	.057

The results of the above table are further shown in the Map at the end of this Report, marked "X," in which those towns, having less than 4 per cent of abortions, are in White; those having from 4 to 6 per cent (both inclusive), are in Gray; and those having over 6 per cent (being the average for the county), are in Black.

Comparing the actual frequency of abortions, with the number of affected farms in the different towns, it is seen that the relation is not positive:

TOWNS.	Per cent of abortions.	Per cent of affected farms.
Newport .....	.124	.60
Fairfield .....	.095	.72
German Flats.....	.074	.22
Herkimer .....	.064	.32
Little Falls.....	.06	.43
Frankfort .....	.054	.20
Litchfield .....	.047	.31
Winfield .....	.047	.31
Schuyler .....	.044	.31
Danube .....	.043	.27
Manheim.....	.039	.35
Stark .....	.039	.19
Warren .....	.038	.13
Columbia .....	.024	.16
Average Herkimer county .....	.06	.32
Hardwick .....	.084	.23
Barre .....	.0083	.07

The irregularity which may be said to be one of the most marked characteristics of this disease, and which has so often interfered with the determination of its probable cause, is well shown in the above table, for while the highest and lowest hold about the same relation to each other, in both columns, in no other part can any constant rule be established; as, for instance, Frankfort, which is sixth in the order of abortions, is eleventh as regards frequency of affected farms; and Manheim, which is eleventh in the order of abortions, is fourth in the order of affected farms; while Warren, having but one-tenth of one per cent less abortions than Manheim, is fourteenth or lowest in the order of affected farms. So that, a high percentage in a town may be brought about either by a few farms being largely affected, or by a large number of farms, each having comparatively a slight loss. Thus Fairfield, having but two per cent more abortions than German Flats, has a little more than three times the percentage of affected farms, the loss in the latter town being brought up by farms having suffered heavily, viz: 94 per cent, 82 per cent, and 61 per cent for each of three farms; 94 per cent being, proportionately, the heaviest loss reported in the county occurring in a dairy of 19 cows.

The disease affects farms lying near each other, very irregularly, also, as regards their comparative percentage of abortions, though a tendency may be said to exist towards a concentration of affected farms to a vicinity. This is further shown, in the diagram at the end of this Report, marked "Z," of all the farms inspected in Herkimer county with the percentage of abortions of each, represented as follows: those having 5 per cent or less being in Green; those between 5 and 10 per cent in Red; those from 10 to 25 per cent in Yellow, and those over 25 per cent in Blue; the non-affected being in White.

Of the 464 farms affected by the disease, 120 had 5 per cent or less of the disease upon them; 126 had from 5 to 10 per cent; 134 had from 10 to 25 per cent, and 84 had over 25 per cent;—about one-half having less than 10 per cent.

To determine the relation between the size of the herd, and the liability to be affected by the disease, the following table is presented, showing the percentage of abortions, the average size of all the herds, and the average size of the affected herds, and the average size of the non-affected herds for each town:

TOWNS.	Per cent of abortion.	Average number in each herd.	Average number in affected herds.	Average number in non-affected herds.
Newport .....	.124	27	30	23
Fairfield .....	.095	36	38	26
German Flats .....	.074	15	20	13
Herkimer .....	.064	25	33	21
Little Falls .....	.06	30	35	27
Frankfort .....	.054	13	20	11
Litchfield.....	.047	18	22	16
Winfield .....	.047	21	23	20
Schuyler .....	.044	21	29	17
Danube .....	.043	22.7	22.5	22.7
Manheim .....	.039	37	42	34
Stark .....	.039	19	19	19
Warren .....	.038	17	21	16
Columbia .....	.024	14	17	13
	<hr/>	<hr/>	<hr/>	<hr/>
	.06	22	29	19
	<hr/>	<hr/>	<hr/>	<hr/>
Hardwick .....	.084	13	17	10
Barre .....	.0083	11	17	11

This table shows, then, that the size of the herd has no constant relation to the percentage of abortions for the towns, for Manheim, which averages the highest number of cows per herd, stands eleventh in order of frequency of abortions; and Frankfort, whose dairies average 13 cows, being the lowest average in Herkimer county, is the fifth in the order of abortions. Fairfield holds the same position with regard to number of cows and frequency of abortions, being in each instance the second, while Newport, whose rate of abortion ranks highest, stands fourth in the order of number of cows per farm.

But it shows further, that the average number of cows on affected farms in a town, is always larger than on those non-affected (with the single exception of the town of Danube, where the non-affected herds average one-fifth of a cow more than those affected); so that, while the size of the herds has no relation to the percentage of abortions in the towns, the tendency of the disease is to affect the larger dairies in a given district.

The number of farms inspected in 1867, in these towns of Herkimer county, was 597, of which 200, or about 33 per cent, were then affected. This year, of the 1,469 farms reported, 464, or $31\frac{1}{2}$ per cent, were affected. This slight difference in favor of 1868, may be accounted for by recalling the fact that last year the inspections were confined to those farms containing 15 or more cows, with the addition of all others containing less than 15 upon which abortions had occurred that year. *This year every farm having cows upon it has been reported, and it may be considered to show, the actual amount of disease in whatever district is referred to,* and will account for the greater percentage of affected farms in 1867.

Comparing the reports of 1867 with the records here given, the percentages of the towns for the two years is as follows, viz:

TOWNS.	1868.	1867.	TOWNS.	1868.	1867.
Newport .....	.124	.09	Winfield .....	.047	.024
Fairfield .....	.095	.11	Schuyler .....	.044	not rep.
German Flats.....	.074	.047	Danube .....	.043	.054
Herkimer. ....	.064	.048	Manheim .....	.039	.056
Little Falls .....	.06	.078	Stark .....	.039	.025
Frankfort .....	.054	not rep.	Warren .....	.038	.019
Litchfield .....	.047	.06	Columbia.....	.024	.018
Total for Herkimer county.....				.06	.055

Comparing this table with the statement just presented, of the total percentage of affected farms during the last two years, it will be seen that while the percentage of affected farms was greater last year, that this year the total percentage of actual abortions is the greater, showing that the disease has actually increased in frequency.

Attention is further directed to the circumstance, that while the total percentage for the county does not vary materially as between the two years, still, with the exceptions of the extremes of two highest and two lowest, considerable differences exist in the towns with regard to their percentages in the different years. Thus German Flats, which is in 1868 the third in rate of actual disease, was in 1867 the eighth; and Manheim, which was then the fifth, is now the ninth, not counting the two towns of Frankfort and Schuyler, not reported in 1867. And reference to the Map "Y," hereto appended, of the results of the inspection in 1867, will show, at a glance, in what towns these differences occurred.

This uncertainty as to the recurrence of the disease may be further illustrated as regards farms by comparing the results of the inspection of 1867 of 71 farms in the town of Little Falls, and of the inspection of the same farms in 1868. Of these 71 farms, 31 escaped the disease in both years; 23 had the disease both years; 8 had the disease in 1867 and escaped in 1868, and 9 which were unaffected in 1867 had the disease in 1868. The comparison shows further, that the percentage of disease in one year bears no positive relation to the percentage the following year; for the 8 which had the disease in 1867, and escaped in 1868, were affected variously, from 2 per cent to 25 per cent; and the 9 which had no disease in 1867, were, in 1868, affected in different amounts, ranging between 3 per cent and 41 per cent.

This uncertain feature is, however, as regards either towns or farms within certain limits, and the proportion of instances in which the disease returns, may be determined with tolerable exactness, as follows: of the 383 farms reporting abortions in 1867, 280, or 73 per cent, had abortions on them again in 1868; of the 899 farms reporting no abortions in 1867, 180, or 20 per cent, had abortions on them in 1868; *or the disease is about 3½ times as likely to recur upon an affected farm as it is to appear upon a previously non-affected farm.*

With regard to the period of pregnancy, at which abortions occur, it is reported as follows:

In the 1st month	0	In the 7th month	341
do 2d do	1	do 8th do	360
do 3d do	10	do 9th do	238
do 4th do	66		
do 5th do	106	Total	1320
do 6th do	198		<hr/>

This report agrees with the report of 1867, except that a larger proportion were then reported occurring during the sixth month, and a smaller proportion towards the ninth month than seems to be the case this year. They agree, however, in the important point, that as pregnancy advances the abortions occur with greater frequency, up to the time when much uncertainty must prevail, as whether the full term of pregnancy has expired or not.

The month of the year, during which abortions occur, can be determined with tolerable precision, as follows:

In the month of April.....	86	In the month of November ..	115
do May.....	27	do December....	215
do June.....	2	do January	354
do July.....	2	do February	426
do August.....	1	do March	358
do September...	18	Total	1644
do October.....	40		<hr/>

Of these 1,644 cases, it will be noticed that 1,468, or 89 per cent, occurred during the five winter months of November, December, January, February and March, during which the cows are kept up, precisely the same percentage as a similar comparison showed to be the case last year. The marked decrease of abortions during April, while a large number are still stabled, is probably owing to the circumstance, that by that time, a large number of the cows have arrived at their full period of gestation, and have calved at term.

The question of the influence exerted by the age of the bulls used for service, engaged the attention of the Commission last year, but it seemed desirable to include it in the reports for this year, and the following results were obtained:

NUMBER OF COWS IMPREGNATED BY	Bull aged 1 year.	Bull aged 2 years.	Bull aged 3 yrs or over.
That carried calf to full term	9,740	19,530	1,482
That aborted	522	1,340	74
	<hr/>	<hr/>	<hr/>
Per cent of abortions	10,262	20,870	1,566
	.05	.064	.047

Showing a slight influence in favor of the use of aged bulls over both the younger classes, but also an influence in favor of yearling bulls over those two years old; so that it cannot be claimed from this, that it is the age alone, which exerts the favorable influence for the aged bulls.

This same question of the age of the bulls, was also referred to the classes of affected and non-affected farms, with the view of the bearing upon the nutrition of the fetus, from excessive use of the bull, and as many bulls are allowed to serve other cows than those on the farms on which they are kept, care was taken to ascertain the full number of cows served:

ON THE AFFECTED FARMS	ON THE NON-AFFECTED FARMS
One year old bulls served 23 cows each.	One year old bulls served 20 cows each.
Two do do 35 do	Two do do 31 do
Three do do 37 do	Three do do 41 do

It may be seen from this list, that while there does not appear to be any excessive strain upon the generative powers of the bulls, at the different ages, yet in the case of the yearlings, and two years old bulls, more cows are, on the average, served on the affected than on the non-affected farms, while in the case of the three years old bulls, the contrary average exists. That this is owing to the habit of using the older bulls for service outside the farms upon which they are kept, is shown if the cows upon the same farms only are taken into the calculation; in both instances of affected and non-affected farms, the average number served by aged bulls is but eighteen.

This question of the age of the bull may be considered further; and although the reports at the service of the Commission, do not show any very marked influence in favor of the aged bulls, so far

as directly affecting the immediate subject under investigation goes, yet a secondary influence is not unlikely to be exerted that must be of interest, and the attention of the Society is directed to the very limited number of aged bulls used, for out of 1,213 bulls used this year, in that part of Herkimer county inspected, but 32 were over two years old, while in Barre, where the percentage of abortions is but four-fifths of one per cent, of 86 bulls used, 28 were over that age. The habit of breeding from immature bulls cannot be too strongly objected to, if we may be allowed to be governed by the experience of those who breed to improve the general constitution of their stock, or by the rule which exists among wild animals, among which the young males are kept from service by the older ones, until they arrive at sufficient maturity and vigor to assert their equality and consequent right to perpetuate their kind; and, while we cannot say that the fetus gotten by a young bull will not live to be delivered, still, the delicate constitution thus liable to be produced, will, if a heifer, and permitted to live and breed, be likely to fail when called upon to go through with the drain, hereafter to be further referred to, in breeding at two years old, and in immediately afterwards being compelled to give an excessive amount of milk.

The principal idea of the farmers, from whom the Commission has this year received reports, with regard to the use of their cows, is to get as much milk as possible therefrom with as little outlay as can be got along with, and therefore a bull is rather a necessary evil than otherwise; and as the smaller the animal is the less it will cost to keep, so, if a bull will but get a cow with calf, his destiny is accomplished, and the calf is killed as soon after birth as the stomach will do for rennet;—that must be saved;—for the records of last year show, that 14,000 out of 17,000 calves born alive at full term, were killed within a few days after birth.

The milking qualities of the dam was intended to be considered, but owing to a typographical error in the blanks, the distinction between good and ordinary milkers was not in all cases obtained; so far, however, as reported, it appears that of 6,464 good milkers in calf, 390, or .06 per cent, aborted; that of 4,954 ordinary milkers in calf, 248, or .05 per cent, aborted; but as the total percentage of abortions among cows, as distinguished from heifers, is reported hereafter at .059 per cent, neither of these classes differs sufficiently from the latter to suggest a probability even that the milking qualities, *per se*, have any marked influence.

The Commission would have been pleased to have given more information on this point, but the full report of 1867, and the partial one of this year, substantially agree, neither showing any marked difference in disease between the two classes of milkers.

The point of interest in this classification, however, being that of over-taxing or exciting irritability in the generative organs of the dam, in hereafter bringing to the attention of the Society the question of the total product of the cow, the most essential point in this connection is not lost; for it is not to be assumed that because one cow naturally gives a larger quantity of milk than another, that she will be the one to abort when exceeding an arbitrary standard, and so far as collected, the reports do not point to any difference. An ordinary milker, who is milked during the later months of pregnancy to make her pay as much for her care as a good milker, is likely to suffer more from the drain, and experience more irritation in her generative organs (of which the mammary gland is an important part) than a cow which, naturally, gives a larger quantity.

Are first pregnancies more or less liable to abortion?

Number of cows in calf (excluding first pregnancies).....	30,971
do do that aborted	1,840
Per cent .....	.059
Number of first pregnancies.....	3,175
do do that aborted.....	182
Per cent .....	.056

This difference is too slight to lead to any other conclusion, than that the same liability to abortion pertains in a first pregnancy, that exists in later ones.

Are cows which have aborted, more likely to abort the year following, than those which have carried their calves to full term?

Of 29,649 cows which carried calf to full term in 1867, 1,698, or .058 per cent, aborted in 1868; of 987 which aborted in 1867, 121, or .12 per cent, aborted in 1868, showing that a cow which has aborted is twice as liable to abort, the following year, as one which has previously carried her calf to full term.

It has been suggested that subjecting cows to changes, from farm to farm, might have a prejudicial effect against carrying calf to full term. With a view of determining this, the following table is presented:

OF THE COWS	That carried calf to full term.	That aborted.	Per cent of abortions.
Raised on the farm, including those brought on as unimpregnated heifers.....	11,730	551	.046
Brought on at any time during or since their first pregnancy	19,961	1,380	.07

Showing a decided influence in favor of raising the cows rather than buying them, as is so frequently done, indiscriminately about the country, or from droves.

For a further illustration of this point, the actual condition, whether pregnant or not pregnant, at the time of removal, was made the subject of inquiry, with the following result:

OF ALL THE COWS BROUGHT ON DURING THE PAST YEAR	That carried calf to full term.	That aborted.	Per cent of abortions.
Number pregnant at time of removal.....	2,322	203	.087
Number <i>not</i> pregnant at time of removal	1,031	24	.02

Showing a very decided objection to subjecting cows to removal during pregnancy, whether compared with all removals, or even with those removals taking place during the non-pregnant condition only. That this would be expected, owing to the greater liability to accident, and from fighting with other cows, is very evident; *but it must be taken into consideration, when providing means to prevent the occurrence of the disease*, and shows the advantage of raising cows on the farm, or subjecting them to change only during the non-pregnant condition.

It has been shown that cows are not more liable to abort during first pregnancies; but whether the effect of early breeding is prejudicial to carrying calf to full term in subsequent pregnancies, is yet to be considered. For the investigation of this point the Inspectors were desired to get the age at which the cows raised upon the farms (or brought on as unimpregnated heifers) first calved; *being those only, which the farmer could state had been under his own observation and care since before their first impregnation.* The reports are contained in the following table:

OF ALL THE COWS RAISED ON THE FARMS	That carried calf to full term.	That aborted.	Per cent of abortions.
No. that first calved at under 3 years of age ..	9,129	462	.05
No. that first calved at 3 years of age or over..	1,902	66	.03

Showing a greater tendency towards abortion, among cows which began breeding at under three years of age, and giving confirmation to what has been said, when referring to the influence of using immature bulls, viz: *that immature stock should not be used for breeding purposes.*

In the further consideration, of whether this practice is more prevalent on affected or on non-affected farms, the reports of Herkimer county show as follows, viz:

Cows.	Affected farms.	Non-affected farms.
Whole number of cows raised	3,372	7,047
Number that first calved under 3 years of age.....	2,869	5,865
Per cent .....	.85	.83

While, therefore, the reports on this point do not show any marked difference, to account for the prevalence of the disease on the affected farms, they do show a very uniformly general practice in Herkimer county, of breeding at a very early age, and if the comparison is extended to the town of Barre, in Massachusetts, where the abortions are but four-fifths of one per cent, it is seen, that the percentage of cows first calving at under three years, is but 77 per cent on the affected farms, and 72 per cent on the non-affected farms.

Leaving this point for the present, and taking the question of the total product of the cows, which bears a very close connection to this, the first consideration is; how much milk do the cows give? and second; does the amount influence gestation?

For the examination of this, the Inspectors were requested to report, for each farm, the average number of pounds of butter and cheese made, and the number of gallons of milk sold. These were reduced to pounds of milk, by multiplying the number of pounds of cheese by ten (10), the pounds of butter by twenty-five

(25), and the gallons of milk by eight (8). These figures may not represent exactly the actual quantity of milk produced, but as in all the calculations hereafter made, these same factors are used, they will be reliable for purposes of comparison.

The census tables for the State of New York, taken in 1865, report the average yield of milk, per cow, for the whole State, to be 2,571 pounds. The following list, taken from the same source, shows the average number of pounds of milk, per cow, from the returns of 183 cheese factories, for 18 counties, being all those reported:

COUNTIES.	Number of factories reported.	Number of cows.	Average lbs. of milk per cow.
*Cattaraugus.....	1	670	1,780
Chautauqua.....	4	1,853	2,643
Chenango	10	4,520	2,743
Cortland.....	5	3,250	2,808
Erie	2	1,385	2,586
*Essex.....	1	1,100	2,408
Herkimer	5	2,383	3,408
Jefferson	15	7,413	2,545
Lewis	16	8,877	2,795
Madison	12	6,700	3,091
Montgomery	4	1,615	2,940
Oneida.....	35	17,358	2,890
*Onondaga.....	1	400	3,329
Oswego.....	11	4,550	2,421
Otsego	5	2,180	2,956
*St. Lawrence.....	1	375	2,953
*Tompkins.....	1	900	3,190
Wyoming	4	1,855	2,361
Summary of 18 counties	133	65,384	2,802
<hr/>		<hr/>	<hr/>
* Five counties represented by	1 each	3,445	2,662

The reports to this Commission, represent the total average quantity of milk obtained from the non-affected farms in Herkimer county, reporting 11,908 cows, at 4,386 pounds per cow.

The table for the cheese factories shows, it is understood, only the actual quantity brought to the factories, while the instructions to the Inspectors, as also to the Enumerators of the census, were in all cases to get the whole yield. The importance of as near an approach to perfect accuracy as possible, was insisted upon to the officers of the Commission, and additional certainty secured by reference, whenever desirable, to the records of cheese factories, to which the milk was taken. It is decidedly the opinion of your Commissioner, from a careful examination of the separate reports, that the amounts given by the Inspectors are a very near approximation to the actual yield, *and yet they demonstrate an average excess of 1,815 pounds more milk, per cow, than the statistics of the whole State determine should be the yield.* Additional evidence, to the effect that the farmers of Herkimer county are demanding a greater than the usual yield, is shown by reference to the above table of cheese factory products, which indicates an excess of 600 pounds of milk more, per cow, from Herkimer county than the average of the other counties, in the same table. It would hardly seem necessary to state, that a drain upon an animal of this amount, and nature, must exert an injurious influence upon the reproductive apparatus, *of which the mammary gland is an important part,* were it not that the habit is of such general frequency that it demands further reference, to be given hereafter.

The effect of abortions upon the supply of milk, may be seen as follows, viz: of 1,651 cows who had borne calf previously, and whose yield would therefore be known, 276 failed to give any milk after aborting; 278 were reported as unaffected in their yield; and of the remaining 1,097, in which a diminution in quantity was reported, 676 averaged a loss of 50 per cent, which may safely be assumed as the loss of the remaining 421, and the whole to be equal to the total loss of the yield of 822 cows. The difference in yield of milk on affected and non-affected farms is as follows (for Herkimer county): The former reporting an average yield of 3,994 pounds per cow, the latter 4,386 pounds per cow; and if it is considered that the latter might be the yield were it not for the abortions, the loss experienced may be stated at 822 times 4,386, which is equal to 3,565,292 pounds of milk, or 356,529 pounds of cheese in this part of Herkimer county, excluding the loss from heifers not counted. The difference in yield of milk between affected and non-affected farms that has been shown in Herkimer county, exists also in Hardwick, where the average yield on the affected farms is

4,260 pounds per cow, and on the non-affected farms it is 4,602 pounds per cow; but in Barre the percentage of abortions being but four-fifths of one per cent, the difference is the other way, for the yield on the affected farms is 5,336 pounds per cow for 163 cows, and on the non-affected it is 4,643 pounds per cow for 953 cows. Now, in Barre, the number of aborting cows is but 11 on 10 farms, which would be too slight a loss to affect the average per cow; and it is worthy of especial note that the first appearance of the disease here, should be upon farms, where the yield reported is so unusually large, and affords additional evidence to the opinion before expressed, *that an excessive drain upon the milking capacity of a pregnant cow is injurious to the healthful performance of the reproductive process.*

To determine the changes that take place in the internal organs of a cow, at the time of aborting, Inspector R. F. HALSTED, M. D., was instructed to procure and make a careful post mortem examination of one within twenty-four hours after abortion had occurred. He was directed to select an uncomplicated case, so far as could be determined, but to observe carefully for any evidence of disease in any organs, especially the uterus and its appendages, and to forward specimens of the muscular coat of the uterus, of the cotyledons, (both fetal and maternal,) of the kidneys, liver, voluntary muscles, and of the blood, bile and urine, to the Commissioner without delay. Dr. HALSTED made such an autopsy, on a cow belonging to Mr. JAMES BLOOD, of Herkimer, and forwarded the following report:

HERKIMER, N. Y., November 28th, 1868.

DR. W. H. CARMALT, *Commissioner, &c. :*

DOCTOR:—

I have the honor to report, that I have this day made a post mortem examination of a cow that had aborted about twenty-four hours previously. So far as I could learn or judge, the case was without complication. I found no trace of disease, or even temporary disturbance in any part except in the uterus, and there nothing except the disorganization of the cotyledons, of which the specimens sent you will give you a fair idea. This case differs from the one I examined last winter, only in this disorganization having reached a more advanced stage. The placenta was expelled only a short time before the cow was killed. Of the calf I know very little. It had been thrown with the manure into the barnyard, and was not in fit condition to form any judgment upon.

Very respectfully, your obd't serv't,

R. F. HALSTED, M. D.,
Inspector N. Y. S. Agricultural Society.

Dr. HALSTED authorizes the further statement, that the fetus was about four and a half months of age.

The specimens forwarded were received in good order on the day following the autopsy, forty-eight hours after the abortion occurred, and were immediately placed in the hands of Prof. JNO. C. DALTON, for microscopical examination, who furnished the following report:

NEW YORK, November 29th, 1868.

DR. WM. H. CARMALT:

DEAR SIR:—

I received from you, to-day, for microscopic examination, specimens of the blood, bile and urine of a cow killed after abortion, together with portions of the liver, kidney, muscular tissue, mucous membrane of the uterus, and maternal and foetal portions of the cotyledons. I have accordingly made the examination, with the following results :

The *blood globules* were natural in size, form, and other physical qualities. The blood contained no abnormal ingredients visible by the microscope.

The *bile* was perfectly clear, showing no microscopic forms whatever.

The *urine* was very nearly clear. Its scanty deposit contained only a few shreds of epithelium and mucus from the urinary bladder.

In the *liver* the glandular cells were of natural size, well defined, granular, and without any unnatural deposit of fat.

The *kidney* was examined both in its cortical and medullary portions. The uriniferous tubules, blood vessels, and Malpighian bodies were natural in appearance.

The *mucous membrane of the uterus* exhibited upon its surface columnar epithelium cells, and many detached nuclei. There was nothing abnormal seen in its structure.

The *foetal portion of the cotyledons* was well injected with blood in its deeper parts, but pallid, very soft, and of a light opaque yellowish color on the surface. The cells of the foetal tufts were very granular, and showed an abundant deposit of minute fat-globules.

The *maternal portion of the cotyledons* was more uniformly filled with blood, and in one spot very strongly injected; but its tissue, nevertheless, showed distinct evidence of fatty degeneration, similar to that of the foetal portion, and even more abundant. Otherwise the cotyledons were natural.

In every instance, I examined thoroughly for any appearance of *cryptogamous spores*, or other form of microscopic vegetation, but without discovering them in either of the specimens.

Yours, very respectfully,

J. C. DALTON.

There is, then, no evidence of any active disease in operation on the part of the dam, as shown by the careful post mortem and microscopical examination of every organ in the body having a probable influence to produce this disease.

What is the evidence of disease on the part of the fetus? Of 4,163 abortions reported in 1867 and 1868, in 3,597, or 86 per cent, the fetus was reported dead, or diseased looking.

There have been but few opportunities offered to the Inspectors, in which to make actual examinations of the fetus as expelled, but

their limited investigations, and the general observations of farmers, unite in describing nothing inflammatory, or otherwise abnormal in the external appearance of the fetus;—but it is usually dead.

The microscopical report by Dr. DALTON states that there was evidence of an abundant fatty degeneration of both fetal and maternal cotyledons, but that they were otherwise natural. As a fatty degeneration is the natural change occurring in the placenta, after cessation of the circulation, the inference is plain that circulation had stopped before the abortion took place;—for the changes noted could not have occurred in the twenty-four hours between the abortion and the time the autopsy was made, but they had probably been going on for some days previously.

If the fact be established, that the uterus and its appendages, and the fetus and its products, are both healthy, the natural changes incident to a stoppage of circulation being all that occurs, an important point is arrived at. And aside from the absence of any traces of preëxisting disease, to be detected by the microscope, symptoms are wanting on the part of the cow to point to anything other than an approaching labor, the evidences of which are, perhaps, unusually marked.

The introduction of a deleterious substance into the food, to affect so large a number of cows, with such uniformity of action, over a large extent of country, besides being in the first place improbable, in the second place has been investigated sufficiently to show that no article, or even variety of articles, occur having properties that would produce these extensive effects.

The existence of microscopic vegetations, or animaleulæ, in the tissues of the cow, has been disproved by the microscopical examination by Dr. DALTON of almost every solid organ, and of all the important fluids.

It is very difficult, and in this investigation unnecessary, to draw an absolute line between forces operating upon bodies so intimately applied, as the fetus and its dam; or to say that in one case the fetus is primarily affected, and in the other it is the dam. In either case, after the death of the fetus occurred, the changes referred to in the microscopical examination would follow, and by the amount of fatty degeneration, an estimate may be formed, as to whether the fetus has been dead for some time or not.

The microscopical examinations in the cases examined each year, indicate that this fatty degeneration had progressed sufficiently, to warrant the belief that the fetus had been dead some days.

To what source, then, must we look for the causes to produce the death of the fetus-in-utero, after excluding those already referred to? It plainly cannot be external violence in all the cases over so wide an extent of country.

Is it mal-nutrition? the blood of the dam or sire being impure:—The evidence is all to the contrary; the cows are well nourished, so far as can be judged from external appearances by persons accustomed to this method of examination, and those skilled in pathological investigation agree that there are no preexisting abnormal appearances in the internal organs. The bulls are healthy, with the exception of a few instances in which the trouble is entirely local; and as has already been said, the descriptions received from farmers almost uniformly state that there is no appearance of disease in the external aspect of the fetus.

If, then, there is no fault in the quality of the nutritive materials furnished to the fetus, does it receive a sufficient supply during the whole period of utero-gestation?

It has already been pointed out that the average yield of milk of all the cows in the State is 2,571 pounds per cow, while the average yield of cows on the non-affected farms examined in Herkimer county this year, is 4,386 pounds per cow, an excess of 70 per cent more milk than the average natural yield of cows, subjected to the same circumstances in other respects, than those herein referred to. That this excess is supplied at the expense of the fetus, is respectfully submitted; but in order to show how, the more important particulars of the reproductive process should be fully understood, and a brief description is therefore introduced.

The essential features in the generative function are, in all cases, *the formation of a germ, which, living for a certain period at the expense of the parent, is afterwards detached therefrom, and takes on a separate existence.* The forms under which this series of phenomena occur, are as various as there are species of animals and plants; but it is absolutely necessary, for its proper performance, that each step of the process should be performed, and in itself complete, before the next takes place.

That the performance of this function makes great demands upon the nutrition of the parent, is of such common knowledge that it is only necessary, here, to refer to the length of time expended in the preparation of the body of the parent, for its own maturity, before the function is called into action; in other words, until it shall be capable of bearing young.

When the germ is not formed from the parent stock, the condition is that of barrenness or sterility.

If the parent is unable, from any cause, to furnish the proper materials for the maintenance of the germ, after fecundation, during the second of the reproductive processes, or that of development; or if, for any reason, either external or internal, the process of furnishing the supply is interfered with, this development is arrested. This arrest may be complete or partial; if complete, the germ dies, it is cast off as a foreign substance, and an abortion is said to occur; if the arrest is partial, a so-called deformity of some part is the usual consequence.

The methods by which the germ is nourished after conception, and before its birth, differ widely in different species of animals. The oviparous animals casting off the germ with its supply of nourishment, together, as an egg, to depend, perhaps, upon other external sources to furnish the conditions necessary to its development; the so-called parent not necessarily supplying any of the nutritive material. The viviparous animals retain the germ, attached to the parent, during the second period of its development, and until it is able to take on an independent existence. This connection in the truly viviparous animals is most intimate, the foetus depending entirely upon the parent for its nutritive supply; and, as it increases in size and multiplicity of parts, making continuously greater demands for the materials necessary to its growth; *which in all cases are furnished more or less directly from the blood of the dam.*

Further differences exist even among viviparous animals in the arrangement of the parts concerned in the reproductive apparatus; and one very large class, the mammalia, is characterized by the presence of an organ—the udder or mammary gland—whose primary and natural function, is to secrete a fluid for the nourishment of the young, immediately, and for a future variable period, after birth; *which fluid is also derived from the blood of the parent.*

The uterus and mammary gland bear a certain inverse relationship to each other, with regard to their activity in function; the one, in the natural condition, being comparatively quiescent when the other is active. In this condition, during the development of the embryo—in other words, the pregnancy of the dam—the uterine organs are in a state of extreme activity, all other parts of the animal economy tending to the proper performance of this function; and the mammary gland, though showing evidences of being influenced by this process, is, in the earlier stages, inactive.

But as pregnancy advances to its natural termination, and preparations are being made for the change that is about to occur, the most marked of these, is the increase in the activity of the mammary gland, which either just before or very soon after delivery secretes the milk designed to be the food of the young animal, whenever the more intimate placental connection is severed. The young animal, after birth, at first depends upon the milk entirely for its nourishment, and the supply of blood, before furnished to the placenta, is now directed to the mammary gland. But as the growth of the young animal enables it to look elsewhere for food, it makes less demand upon the dam: the supply of milk diminishes in quantity, and the uterine organs, *having had opportunity to return to their previous condition*, are again stimulated to the performance of their natural function; and when pregnancy again occurs, *the blood is redirected to the uterus, and the mammary glands diminish in activity*, soon become quiescent, and the same series of phenomena are again repeated.

In this hasty sketch of the main points in the history of the reproductive process, as it occurs naturally, uninterfered with by habits of domestication, your attention is called to the inverse relationship between the activity of the uterine organs and the mammary glands. By means of the first of these, the young animal is nourished during the period of its development, and by the second, during the period of its early growth.

The animal economy does not, as a rule, allow both of these processes to go on for a length of time together—it cannot support both at the same time. The instances in nature in which the dam at once suckles one offspring and carries another, are rare. The reproductive process is a great demand upon the parent. Nature requires a long period for its preparation, has made certain laws for its government while it is going on, and after a certain period has been devoted to its performance, regulates its cessation. A constant violation of any of its more important laws, must bring about a failure somewhere in its proper performance.

The size and functional activity of the mammary gland differs much in different species of animals, and may be very decidedly influenced, even in the same species, by a difference in circumstances and treatment; and it is further possible, by a long continued system of breeding, *carefully regulated by laws that have been found to perpetuate differences in breeds*, to increase permanently the capacity to produce more than the previous natural quantity.

of milk; and it is by recognizing and acting upon these laws, that the different breeds of the domestic cow have been established, and her present milk-producing capacity reached. But it is necessary that the process should be a gradual one, *brought about by the continued repetition for generations*, of the union of two animals of opposite sexes, having the same tendency as regards this function;—the bull, as shown by his descent, from a line of good milkers, the cow, by her own capacity and similar descent. If, however, instead of following these rules, the attempt is made to get a large increase at once, first, by forcing the uterine reproductive apparatus into activity before the animal has arrived at full maturity, and afterwards by continuing the drain upon the mammary secretion at the same time that a second foetus is demanding its supply by the placenta—*by the first practice the uterine reproductive apparatus is weakened, and a liability to abortion established; and by the second, the natural supply of blood, which should go during pregnancy to the uterus to nourish the foetus, is continued to be drawn in the other direction towards the mammary gland, arrest of development from inunction is endangered, and when it occurs, the foetus is expelled as a foreign body.*

Now, it is respectfully submitted, that the reports to this Commission from the dairy districts of New York, and to a more limited extent those of Massachusetts, during the last two years, show an habitual violation of both the laws governing the time at which the reproductive process should begin, and those regulating the nourishment of the foetus-in-utero.

In the first place, in the year 1867, from the reports of 1,453 farms, it appears that on 1,047, or 72 per cent of farms, the habit is to impregnate the heifers at from one to one and a half years of age. The reports of this year state that out of 11,549 cows raised by the farmers reporting them, 9,591, or 83 per cent of cows, first calved at under three years of age.

If an animal be allowed to bear young much before it has arrived at maturity, *the process of reproduction, being essentially antagonistic to that of nutrition*, must interfere to a greater or less degree with its full growth, which of course depends upon its nutrition. An animal cannot be said to have arrived at maturity, simply because it is able to be fecundated; the phenomenon of ovulation, or heat, is but a part of the reproductive process; for the successful carrying out of the whole, the rest of the animal system should have acquired strength of constitution and vigor, sufficient to bear

the tax of having a part of its nutritive materials taken by the foetus, and this requires that nearly the full growth of its organs should be attained.

Now, a heifer at two years is not fully grown, and yet it is shown that 83 per cent of those raised, in the districts where abortions prevail, have been, for from the six to nine months preceding this age, subjected to a process in opposition to that of growth. And although it cannot be said that any one heifer, impregnated with a view to have her calve at two years old, will not carry to term, there is danger that the effect may, by reason of the strain upon the constitution thus produced, be felt in the subsequent pregnancies; and a table previously given shows, that while five per cent of those which first calved under three years of age aborted, in some of the subsequent pregnancies, the abortions among those which first calved at three years old or over, was but three per cent.

In the second place, the amount of milk demanded per cow, in the districts examined this year, as has been shown, is 70 per cent greater than the amount determined, by the yield of 1,195,000 cows, to be the natural yield. It is respectfully submitted, that this constitutes a violation of the rule that an animal but very seldom naturally suckles one offspring at the same time she is pregnant with another; in other words, that the milk-secreting organs shall be in a condition of comparative quiescence during the period of gestation.

Now, the excessive yield here indicated, is brought about, by first getting all the milk possible during the height of the season, and secondly, by continuing the process as long as possible—as long as the mammary gland can, by any means, be stimulated to activity—and yet, during the latter part of this time, the cow is pregnant; the foetus is demanding an unusual supply of blood to the placenta for its nourishment, and the farmer is demanding a supply to the mammary gland for milk, forgetful entirely, apparently, that the original design of the whole reproductive apparatus is to perpetuate the species;—not to get milk simply. Under the circumstances of this drain, either the cow must refuse to give the milk, and be dried off, or the development of the foetus, which is now the lowest in order of vitality, is checked from lack of nourishment. In a certain number of cases the latter occurs, and an abortion is the result.

In further confirmation of this view, of the arrest of development

from lack of nourishment, attention is called to the table indicating the period of pregnancy at which abortions most frequently occur, and it will be seen that of 1,320 abortions, 939, or 71 per cent, occur during the last three months of utero-gestation, at the time the foetus must be considered as making the greatest demand upon the dam for its nutrition; and yet, the reports of 1867 indicate a habit of milking the cows to as late a period of pregnancy as they will give milk. The expressions not infrequently occurred in reply to the question: What month of pregnancy are the cows dried off from milking? "As long as it will pay." "I milk for a pint." "As long as possible." And in but few instances, were farmers able to give reliable answers as to the exact period of pregnancy at which any individual cows were dried off. Further evidence on this point would be desirable, but the report of every Inspector, derived from the general statements of farmers, has been, that the habit almost universally exists of milking the cows to the last paying drop.

Besides the arrest of development from inanition, thus brought about, the persistent dragging at the mammary gland for milk, during the later months of pregnancy, is a source of irritation to the uterus, by reason of the intimate physiological connection between these organs, and tends very materially to excite contractions in the uterus.

That irritation of this kind to the mammary gland in the pregnant human female will occasion contractions in the uterus, and abortion, is well known to and practiced by physicians when that object is to be attained. And if, in the domestic cow, a liability to abortion by too early breeding is established, and a tendency to the arrest of foetal development endangered by inanition, it is not improbable that so constant an irritation as this will account for many cases of abortion.

The rule in the human female is very positive against the two processes of lactation and pregnancy going on, for a length of time, together, and its continued violation is there followed by directly the consequences here complained of in the domestic cow. If, during lactation, pregnancy occurs, the former process must be stopped, or the mother is liable to a miscarriage; or, *vice versa*, if lactation is stopped, the phenomenon of ovulation, *theretofore in abeyance*, now begins again. And although it cannot be stated that in the cow, as also among other of the domestic animals, that these processes cannot go on safely for a limited period together, still,

natural historians and physiologists, when speaking of the periods at which wild animals reproduce their young, assume the rule in general terms. For, they say, "the duration of lactation being, in general, equal in duration to that of gestation,"* therefore, such or such an animal produces young once in so often, *making the time, at least, double that of the known length of pregnancy.* They also, however, state as a law, that habits of domestication tend to increase the power of reproduction within certain limits, both as regards frequency of occurrence, and the number produced at a birth, and so far, indirectly, acknowledge that a yield of milk in excess of that required by the animal, may be brought about by following correct principles in breeding. But we may also be allowed to reason, that a *sudden* demand of 70 per cent more milk from one set of cows, over others of the same breeds, subjected in all other respects to the same care and treatment, is too great a variation from the natural law, to be permitted without a check somewhere;—and it is seen that where this excess is demanded abortions occur.

The affirmative results obtained by the Commission, this year, may therefore be briefly stated as follows, viz:

1st. That cows, which have first calved at under three years of age, are more liable to abort during their subsequent pregnancies, than those who first calved at three years of age or over, in the proportion of five to three; and that 83 per cent of the cows raised on the farms reporting them, do first calve at under three years of age.

2d. That cows, subjected to removals at any time, are liable to abort, over those raised on the farms, in the proportion of 7 to $4\frac{1}{2}$; and that 63 per cent are thus removed.

3d. That cows, subjected to removals during pregnancy, are liable to abort, over those moved while not pregnant, in the proportion of nine to two; and that 70 per cent of those moved yearly are pregnant, and 17 per cent are moved yearly.

4th. That arrest of development is the condition immediately preceding the abortion; that an excessive drain upon the secretion of milk, during pregnancy, has a tendency to produce arrest of development in the fetus, from inanition; and that an excess of 70 per cent of milk is demanded from the cows in this district where abortions prevail.

* Flourens; *Physiologie comparée.* Paris, 1856; p. 32.

In submitting these views for the consideration of the Society, it must be understood that no claim is made that these are all the causes that produce the abortions complained of, or that any one of them has by itself given rise to this trouble. The points desired to be shown are, that the practices of breeding from stock at the very early age indicated, and the exacting from the dam the excessive amount of milk shown to be drawn, have each injurious influences upon the reproductive process, tending to produce abortions; and that, *acting together*, they in many cases do produce this result. And if it be allowed that these practices are markedly prejudicial, then various extraneous circumstances, impracticable to enumerate, which, under other conditions, would have little or no effect, now exert an active influence to bring about the disease.

To so general an extent do these practices prevail, that it has been found practically impossible, to separate the farms in which they exist from those that do not; for some farmers breed one part of their heifers at two years old, and another part at three years old, and the farm must thus be included in both classes. And the irregularities heretofore referred to, with regard to the appearance or disappearance of the disease in towns, or farms, or cows, may be accounted for, in part, by the changes made in the herds between different farms.

The Commission endeavored to obtain information with regard to the first appearance of the disease on each farm, with a view to determine, if possible, the primary influences affecting the cows first aborting; but in Herkimer county the disease has been of so long standing; changes among the cows are so constantly made, as also to less extent among the occupants of farms, that it was found impossible to derive much information upon this point there. In the town of Hardwick, Massachusetts, however, more definite answers could be obtained. The disease has existed there but a short time; the dairies are smaller; so many changes among the stock have not occurred, and the disease was therefore more easily traced. The replies are tabulated as follows:

Of all the farms reporting abortions upon them in this or previous years:

1st. Number in which the first appearance could be traced directly to the introduction of animals (bulls, cows, or heifers in calf) from an aborting dairy	14
2d. Occurred in cows introduced that year from a non-aborting dairy	1

3d. Occurred in cows which had been on the farm one year or more, and had not, so far as known, been brought in contact with an aborting dairy	11
4th. Occurred in cows whose previous history was unknown	5
Total.....	<u>31</u>

The largest proportion of farms, it will be noticed above, is of those which report the access of the disease, as coincident with the introduction of animals from an infected dairy; but the next largest is the one in which the cows had been on the farm for one year or more, and were not brought in contact with an aborting dairy; and the difference between these two, directly antagonistic, classes is, in this town, too slight to consider, that the disease is any more liable to be first introduced from a source foreign to the farm, than it is to occur thereon spontaneously.

With regard to whether a so-called sympathetic influence could have an effect upon the disease, the only manner in which an inquiry could be brought to bear was, to get evidence as to whether the sight, smell or other knowledge of an aborted fetus or its products exerted any influence upon an apparently healthy pregnant cow; but as no farmer, among those reporting abortions in this or previous years, acknowledged having taken any especial care to remove the fetal products, except in a very few instances "to throw it over the fence, out of the barnyard;" and as the aborting cows were not even then separated from the rest of the herd, no decision could be arrived at on this point.

The expenses of the Commission have been as follows:

Salaries of Inspectors.....	\$1,210 00
Current expenses of Inspectors.....	920 15
Salaries of Assistant Inspectors.....	600 00
Current expenses of Assistant Inspectors.....	630 93
Salary of acting Assis't Inspector, 23 days, at \$100 per mo..	77 00
Cow for autopsy.....	14 28
Mounting plants; &c.....	30 82
Stationery	6 97
Printing	48 00
Maps, &c	20 61
Express and postage	14 30
Traveling expenses of Commissioner.....	37 52
Salary of Commissioner.....	<u>1,000 00</u>
Total.....	<u>\$4,610 58</u>

The Commission is under especial obligation to Inspector R. F. HALSTED, M. D., for the unusual care always taken to obtain accurate information, as well as for the interest displayed in the investigation throughout. Both he, and the Assistant Inspectors, Drs. BENJAMIN R. SWAN, DANIEL W. KISSAM and N. A. LINDLEY, worked assiduously while on duty, and their labors were in many respects fatiguing.

Acknowledgments for the microscopical examination and report are also due to Prof. JOHN C. DALTON; and also to Messrs. CHARLES J. SPRAGUE and JOHN L. RUSSELL, of Massachusetts, for the classification and report on fungi.

Respectfully submitted;

W. H. CARMALT, M. D.,
Commissioner.

(A.)

REPORT OF THE

*Farm cultivated by Mr _____
 In the Town of _____ County of _____
 State of _____.*

Number of Calves born alive at full term, from April 1, 1867,
 to April 1, 1868.....
 Number of Abortions occurring from April 1, 1867, to April
 1, 1868.....
 Total number of Cows in calf from April 1, '67, to April 1, '68

Number of Abortions occurring in the—
 1st Month of Pregnancy.....
 2d Month of Pregnancy.....
 3d Month of Pregnancy.....
 4th Month of Pregnancy.....
 5th Month of Pregnancy.....
 6th Month of Pregnancy.....
 7th Month of Pregnancy.....
 8th Month of Pregnancy.....
 9th Month of Pregnancy.....
 Total

Number of Abortions occurring in the Month of—
 April | November
 May | December
 June | January
 July | February
 August | March
 September |
 October | Total

Number of aborted Calves born dead or diseased-looking.....
 Number of aborted Calves born alive and healthy-looking,
 according to age.....
 Total

NUMBER OF COWS IMPREGNATED BY

	BULL AGED 1 YEAR.	BULL AGED 2 YEARS.	BULL AGED 3 YRS. OR OVER.	TOTAL.
That carried Calf to full term				
That aborted.....				

How many Cows in all were served during the year 1867-8, by Bull aged 1 year?.....

How many Cows in all were served during the year 1867-8, by Bull aged 2 years?.....

How many Cows in all were served during the year 1867-8, by Bull aged 3 years or over?.....

	NUMBER OF COWS THAT WERE			
	GOOD MILKERS. Averaging more than 7 quarts per day.	ORDINARY MILK'S. Averaging less than 7 quarts per day.	FIRST PREGNANCY.	TOTAL.
That carried Calf to full term				
That aborted				
Total.....				
OF THOSE COWS THAT ABORTED,				
In how many did the yield of milk entirely fail?....				
*In how many did the yield of milk diminish in quan- tity?.....				
In how many was the yield of milk unaffected?.....				
Total.....				
* In what proportion to their usual yield?				

Number that were sick immediately before, during, or after abortion
 Number that were *not* sick immediately before, during, or after abortion
 Total

What symptoms does the Cow exhibit when sick, before, during or after abortion; as to appetite, emaciation, stupor or restlessness, unnatural discharges, or other particulars?

OF ALL THE COWS ON THIS FARM IN THE YEAR 1867-8

	THAT CARRIED CALF TO FULL TERM.	THAT ABORTED.	TOTAL.
Number of cases of first pregnancy.....			
Number that had borne calf at full term the previous year..			
Number that had aborted the previous year			
Total			
Number raised on this farm..			
Number brought on as unim- pregnated heifers.....			
Number brought on pregnant during the past year.....			
Number brought on <i>not</i> preg- nant during the past year...			
Number that have been on this farm one year or more			
Total			
<hr/>			
OF ALL THOSE RAISED ON THIS FARM FROM HEIFERS.			
How many first calved under 3 years of age			
How many first calved at 3 years of age, or over.....			
Total			

What was the average quantity of milk sold from this farm, per cow, in the year 1867-8 ? gallons.

What was the average amount of butter made on this farm, per cow, in the year 1867-8 ? pounds.

What was the average amount of cheese made on this farm, per cow, in the year 1867-8 ? pounds.

Upon what kinds of hay are the cows fed ?

Was the hay well cured and sweet ?

What root crops are given, and how much to each cow ? Turnips
carrots beets parsnips potatoes.

What ground feed, and how much to each cow ? Oats rye
buckwheat barley wheat-bran.

Is the grain used for ground feed raised on the farm or purchased ? If so, where ?

Investigate and report upon the following points:

- 1st. The manner of the first appearance of the disease on this farm.
- 2d. What evidence there may be that the sight, smell or other knowledge of an aborted fœtus, or its products, will cause an apparently healthy pregnant cow to abort.
- 3d. Any other actual facts that go towards accounting for the occurrence and spread of this disease upon this farm.

(B.)

REPORT ON PLANTS GROWING SPONTANEOUSLY IN DANUBE.

[Specimens of the Numbered plants are in the Rooms of the Agricultural Society. Specimens of those designated by an Asterisk (*) were not preserved.]

CLASSIFICATION.	Common Name.	Habitat.	Frequency.	Where found or noted.
Ranunculaceæ.	“Crownfoot Family.” Common Virgin’s-bower ..	Fence-rows	General but scarce	W. R. Stevens, A. Devendorf, Jacob Wairath, Fr. Lewis, H. Haupt, S. G. Spoor, L. Green, J. E. Fox, P. Baum, N. N. Schuyler, A. Jones, A. Decker, E. Decker, Edt. Simms, Jno. Snell, G. Spoor, A. Miller.
1. Clematis Virginiana.—L.....				On all farms. L. Green, jno. Smith. In all woods.
2. Anemone Virginiana.—L.....	Tall Anemone.....	Fence-rows	General but scarce	W. R. Stevens.
3. Anemone Pennsylvanica.—L.....	Pennsyl-vania Anemone ..	Meadows	Rare	L. N. Gros.
4. Hepatica acutiloba.—D. C.....	Sharp-lobed Hepatica	Woods	General and common	G. F. Bellinger.
5. Thalictrum divaricatum.—L.....	Early meadow Rue	Woods	Probably general but scarce	On all farms.
*Thalictrum purpureascens.—L.....	Purple meadow Rue	Roadsides	Rare	Near Fink ² basin.
6. Thalictrum Cormutii.—L.....	Meadow Rue	Meadows	Rare	L. N. Gros. (scarce), L. Green (abundant).
*Ranunculus abortivus.—L.....	Small flowered Crowfoot ..	Woods	Rare	W. R. Stevens.
*Ranunculus secalifolius.—L.....	Cursed Crowfoot	Ditches	Rare	L. N. Gros.
7. Ranunculus Pennsylvanicus.—L.....	Bristly Crowfoot	Meadows	Rare	
8. Ranunculus aceris.—L.....	Tall Crowfoot, Buttercup ..	Meadows and pastures ..	General and abundant	
9. Actea spicata.—L.	Red Bane berry	Thickets and woods	General and common	
10. Actea alba.—Michx	White Bane berry, Cohosh	Thickets and woods	General and common	
*Magnoliaceæ.	“Magnolia Family.” Tulip Tree	Woods	General but scarce	In most forests.
*Liriodendron Tulipifera.—L.....	“Moon-seed Family.” Canad. Moon-seed	Fence-rows	Probable general but scarce	W. R. Stevens, A. Devendorf.
Menispermaceæ.	Menispermum Canadense.—L.			
11. Menispermum Canadense.—L.	Canad. Moon-seed			

B—Continued.

CLASSIFICATION.	Common Name.	Habitat.	Frequency.	Where found or noted.
12. <i>Herberidaceæ</i> . • <i>Caulophyllum thalictroides</i> .—Michx.	“Barberry Family.” Papoose-root.	Woods *	General and common	W. R. Stevens, S. G. Stoor (Van Allen ten th), A. J. & S. Stafford. A. Devendorf.
13. <i>Podocephalum peltatum</i> .—L. • <i>Papaveraceæ</i> . • <i>Cheledonium majus</i> .—L.	May Apple, Mandrake. “Poppy Family.” Celadine.	Meadows, pastures and woods, Roadsides	General and common	Not noted as to locality.
• <i>Fumariaceæ</i> . • <i>Dicentra Canadensis</i> .—D. C.	“Fumitory Family.” Squirrel Corn.	Woods	Rare (extremely)	G. Bellinger.
• <i>Cruciferae</i> . • <i>Nasturtium armoracia</i> .—Fries.	“Mustard Family.” Horse-radish.	Yards	Probably general but scarce.	A. Miller.
14. <i>Nasturtium palustre</i> .—D. C. • <i>Clarkianina hispida</i> .—Lam.	Marsh Cross. Common bitter Cress.	Pastures, Pastures,	Rare	J. E. Fox.
• <i>Arabis hirsutissima</i> .—R. Br.	Yellow Rocket.	Meadows	Rare	J. E. Fox.
15. <i>Barbaria vulgaris</i> .—R. Br.	Common Winter Cress, Hedge mustard.	Meadows, pastures and woods,	General but scarce	W. R. Stevens.
• <i>Sisymbrium officinale</i> .—Scop. • <i>Sinapis (Brassica) nitra</i> .—L.	Black mustard. Field Mustard, Charlock.	Yards	General but scarce	W. R. Stevens, H. N. Gros. W. R. Stevens, H. N. Gros.
16. <i>Sinapis (Brassica) arvensis</i> .—L.	Shepherd's Purse.	Yards and gardens, Grain-fields.....	General, often abundant.	Levi Walrath (lat.).
17. <i>Capsella Bursa-pastoris</i> .—Moench. • <i>Dentaria diphylla</i> .—L.	Shepherd's Purse.	Yards and gardens, Woods,	General and common	W. R. Stevens, H. N. Gros. Jacob Walrath.
• <i>Violaceæ</i> .	“Violet Family.”	Woods	Rare	A. Decker.
18. <i>Viola rotundifolia</i> .—Michx. 19. <i>Viola cucullata</i> .—Alt. var. cordata	Round leaved Violet. Common blue Violet.	Meadows and pastures.	Rare	W. R. Stevens, A. Devendorf.
20. <i>Viola striata</i> .—Alt. 21. <i>Viola Canadensis</i> .—L. 22. <i>Viola pulcherrima</i> .—Alt.	Pale Violet. Canada Violet. Poorly Yellow Violet.	Pale Woods,	General and common	In all woods.
		Woods,	Rare	W. R. Stevens.
		Woods,	General but scarce	W. R. Stevens, A. Devendorf.

	" <i>St. John's Wort Family.</i> "	Meadows and pastures.....	E. Coville's pastures (abundantly). W. R. Stevens, Jacob Shall.
23. <i>Hypericum perforatum</i> .— <i>L.</i>	St. John's Wort.....	Meadows and pastures.....	Rare
24. <i>Hypericum corymbosum</i> .— <i>Muhl.</i>	" " <i>Pink Family.</i> "	Pastures.....	Rare
25. <i>Saponaria officinalis</i> .— <i>L.</i>	Common or "Soap" Wort, Bouncing Bet.	Grain-fields.....	General and common
26. <i>Silene noctiflora</i> .— <i>L.</i>	Night-flowering Catch-fly.	Meadows, pastures and woods.	General and common
27. <i>Stellaria media</i> .— <i>Smith</i>	Common Chick-weed	Pastures.....	Rare
28. <i>Stellaria longipes</i> .— <i>Goldsie</i>	Long-stalked Stitch-wort.	Meadows, pastures, grain- fields and woods.	General and common
29. <i>Ceratium viscosum</i> .— <i>L.</i>	Large mouse-eared Chick- weed.	(Grain fields	General, variable in fre- quency.
30. <i>Spergula arvensis</i> .— <i>L.</i>	Corn spurrey	Gardens	General and common
	" " <i>Purse-lane Family.</i> "	" "	On most farms.
	* <i>Portulacaceæ</i> .	Common Purslane	
31. <i>Malva Mosechata</i> .— <i>L.</i>	" " <i>Malvo Family.</i> "	Roadsides	W. R. Stevens, H. N. Gros.
* <i>Malva rotundifolia</i> .— <i>L.</i>	Musk Mallow	Gardens	On most farms.
* <i>Abutilon Avicenne</i> .— <i>Gentz</i>	Common Mallow..	Roadsides	Near Castle Church.
32. <i>Tilia Americana</i> .— <i>L.</i>	Velvet Leaf.....	" "	
	" " <i>Linden Family.</i> "	Bass wood	General and common
33. <i>Linum usitatissimum</i> .— <i>L.</i>	" " <i>Flax Family.</i> "	Woods.....	In all woods.
	* <i>Geraniaceæ</i> .	Common Flax.....	General and common
	" " <i>Geranium Family.</i> "	Grain-fields.....	Rare
34. <i>Geranium maculatum</i> .— <i>L.</i>	Wild Crane's bill.....	Meadows and pastures..	Rare
	Herb Robert.....	Woods.....	In all woods.
35. <i>Impatiens pallida</i> .— <i>Kunt</i>	Pale Touch-me-not.....	Woods.....	Ed. Simms, A. Jones.
* <i>Impatiens fulva</i> .— <i>Nutt.</i>	Spotted Touch-me-not	Pastures and woods	Probably general but scarce.
* <i>Oxalis Acetosella</i> .— <i>L.</i>	Common Wood-sorrel	Woods.....	General but scarce.
36. <i>Oxalis stricta</i> .— <i>L.</i>	Yellow Wood-sorrel	Meadows, pastures and woods.	General and common
			General and usually abun- dant.
			Bellinger.
			On all farms.

B—Continued.

CLASSIFICATION.	Common Name.	Habitat.	Frequency.	Where found or noted.
<i>Anacardiaceæ.</i>	" <i>Cashew Family.</i> "	Fence-rows	General and common	W. R. Stevens, A. Devendorf,
37. <i>Rhus typhina</i> .— <i>L.</i>	Staghorn Sumach	Fence-rows	Rare	Fr. Lewis, S. G. Spoor,
38. * <i>Rhus glabra</i> .— <i>L.</i>	Smooth Sumach	Fence-rows	Rare	E. Simmons, G. Bellinger,
38. <i>Rhus Toxicodendron</i> , var. <i>virginiana</i> .— <i>L.</i>	Poison Ivy, Poison Oak	Fence-rows	Rare	D. Tellinger, Jos. Snell,
<i>Vitaceæ.</i>	" <i>Vine Family.</i> "	Winter or Frost Grape ...	Fence-rows	G. Spoor, J. J. Rickard,
39. <i>Vitis cordifolia</i> .— <i>Michx.</i>	Virginia Creeper	Fence-rows	General but scarce	A. Miller.
40. <i>Ampelopsis quinquefolia</i> .— <i>Michx.</i>	Virginia Creeper	Fence-rows	Rare	Jacob Walrath, Fr. Lewis,
<i>Celastraceæ.</i>	" <i>Staff-Tree Family.</i> "	Climbing Bitter-sweet	Fence-rows	N. N. Schuyler, A. Jones,
* <i>Celastrus scandens</i> .— <i>L.</i>	Striped Bitter-sweet	Woods	Rare	A. & P. Cramer, H. N. Gross,
<i>Sapindaceæ.</i>	" <i>Soap-berry Family.</i> "	Mountain Maple	General and common	W. R. Stevens, Jacob Wal-
41. <i>Acer pensylvanicum</i> .— <i>L.</i>	Mountain Maple	Woods	In all forests.	rat, N. N. Schuyler.
42. <i>Acer saccharinum</i> .— <i>Wong.</i>	Sugar Maple	Woods	In all forests.	
43. <i>Acer saccharinum</i> , var. <i>nigrum</i> .— <i>Wong.</i>	Black sugar Maple	Woods	In all forests.	
<i>Polygonaceæ.</i>	" <i>Milk-weed Family.</i> "	Roadsides,	Rare	Mrs. Devendorf (Briggs' ten').
* <i>Polygala verticillata</i> .— <i>L.</i>	" <i>Pulse Family.</i> "	Roadsides,	Rare	
<i>Lagunculariæ.</i>	" <i>Pulse Family.</i> "	Red Clover	General and abundant, from one-quarter to one-quarter of all hay and pastures.	
44. <i>Trifolium pratense</i> .— <i>L.</i>	White Clover	Meadows, pastures and woods.	On all farms, from one-fifth to one-quarter of all pastures, and a large proportion of the hay.	
45. <i>Trifolium repens</i> .— <i>L.</i>	Yellow Hop Clover	Meadows,	Rare	Ar. Jones.
P. <i>Trifolium Agaratum</i> .— <i>L.</i>	Yellow Hop Clover			

47. <i>Melilotus officinalis</i> .— <i>Willd.</i>	Yellow Melilot	Waste places,	Rare	<i>L.</i> , Green, H. N. Gros, Ar. Jones (near canal in each). Along creek from Newville to Castle Church.
48. <i>Melilotus alba</i> .— <i>Lam.</i>	White Meliot	Waste places,	Bare	Abundant on W. R. Stevens and A. Davendorf; common on Fr. Lewis, S. G. Spoor, H. Green, J. E. Fox (Smith tent), P. Baum, N. N. Schuyler, A. Jones, A. Decker, R. Landt, Ed. Simms, S. P. Jones, E. Decker, H. N. Gros, L. Green.
49. <i>Medicago lupulina</i> .— <i>L.</i>	Black Medick, Non-such.	Meadows and pastures,	Probably general and common.	Fr. Lewis, E. Decker, J. G. Snell.
50. <i>Desmodium acuminatum</i> .— <i>D. C.</i>	Woods	Woods	Rare	Jno. Shall. Abundant in newly seeded meadows of A. J. & S. Stanford, H. Peterle, Jos. Snell, N. N. Schuyler, A. Fox, Mrs. Walrath, Jno. Shall, J. J. Shall, Ar. Jones.
51. <i>Desmodium Canadense</i> .— <i>D. C.</i>	Meadows and thickets.	Meadows, pastures and grain-fields.	Rare	A. Jones.
52. <i>Vicia sativa</i> .— <i>L.</i>	Common Vetch or Tare.	General and common.	Rare	Ed. Simms.
53. <i>Phaseolus perennis</i> .— <i>L.</i>	Pastures,	Pastures,	Rare	S. G. Spoor, Fr. Lewis, H. Haupt.
54. <i>Ampelisca monoica</i> .— <i>Nutt.</i>	Woods	Woods	Rare	S. G. Spoor, Jno. Smith.
<i>Rosaceae.</i>				
* <i>Prunus pensylvanica</i> .— <i>L.</i>	“Rose Family.” Wild red Cherry	Meadows and pastures.	General but scarce	W. R. Stevens, S. G. Spoor, Fr. Lewis, H. Haupt.
* <i>Prunus Virginiana</i> .— <i>L.</i>	Choke Cherry	Meadows and pastures.	General but scarce	On all farms. W. R. Stevens, H. N. Gros, L. Green.
55. <i>Prunus serotina</i> .— <i>Ehrhart</i>	Wild black Cherry	Fence-rows	General but scarce	On all farms. W. R. Stevens, Fr. Lewis, H. Haupt.
56. <i>Agrimonia Eupatoria</i> .— <i>L.</i>	Common Agrimony	Fence-rows	General but scarce	On all farms. W. R. Stevens, Fr. Lewis, H. Haupt.
57. <i>Geum album</i> .— <i>Gmelin</i>	Fence-rows	Fence-rows	Rare	On all farms. W. R. Stevens, Fr. Lewis, H. Haupt.
58. <i>Geum strictum</i> .— <i>Alt</i>	Fence-rows	Fence-rows	General and common	On all farms. W. R. Stevens, Fr. Lewis, H. Haupt.
59. <i>Geum rivale</i> .— <i>L.</i>	Water or purple Avena	Meadows (in bog)	General but scarce	On all farms. W. R. Stevens, Fr. Lewis, H. Haupt.
60. <i>Walsteinia fragarioides</i> .— <i>Traut</i>	Barren Strawberry	Woods	General and common	On all farms. E. Decker.
61. <i>Potentilla Norvegica</i> .— <i>L.</i>	Common Five-finger	Meadows and pastures.	General and common	W. R. Stevens, A. Dendorf.
* <i>Potentilla Canadensis</i> .— <i>L.</i>	Silvery Five-finger	Meadows and pastures.	Rare	In all woods.
62. <i>Potentilla argentea</i> .— <i>L.</i>	Wild Strawberry	Pastures.	General and common	
63. <i>Fragaria Virginiana</i> .— <i>Ehrhart</i>	Wild Strawberry	Woods	General and common	

B—Continued.

CLASSIFICATION.	Common Name.	Habitat.	Frequency.	Where found or noted.
<i>Rosaceæ</i> —Continued.				
* <i>Frangula</i> <i>vesca</i> .— <i>L.</i>	“Rose Family”—Contined.	Meadows, pastures and woods.	General and common	In all woods.
64. <i>Dalibarda repens</i> .— <i>L.</i>	Wild Strawberry	Postures	Rare	H. Haupt.
65. <i>Rubus odoratus</i> .— <i>L.</i>	Purple-flowering Raspberry	Fence-rows and banks	General and common	On all farms.
66. <i>Rubus triflorus</i> .—Richardson	Dwarf Raspberry	Woods	Rare	W. R. Stevens, A. Devendorf, L. Green.
67. <i>Rubus strigosus</i> .—Michx.	Wild red Raspberry	Fence-rows and thickets.	General and common	On all farms.
68. <i>Rubus occidentalis</i> .— <i>L.</i>	Black Raspberry	Fence-rows and thickets.	General but scarce	On all farms.
69. <i>Rubus villosus</i> .—Ait.	Common or high Blackberry.	Fence-rows and thickets.	General but scarce	On all farms.
70. <i>Rubus ulmifolius</i> .— <i>L.</i>	True Sweet-brier	Fence-rows and thickets.	General but scarce	On all farms.
71. <i>Rosa rugosa</i> .— <i>L.</i>	Sauerk-fruitied Thorn	Fence-rows and thickets.	General but scarce	On all farms.
72. <i>Crautus cordata</i> .— <i>L.</i>	Black or Pine Thorn	Fence-rows and thickets.	General but scarce	On all farms.
73. <i>Crautus formosa</i> .— <i>L.</i>	“Saxifrage Family.”	Fence-rows and thickets.	General and common	On all farms.
74. <i>Crautus cordifolia</i> .— <i>L.</i>	Wild gooseberry	Thickets	Rare	A. J. & S. Stanford, L. Green.
75. <i>Carica papaya</i> .— <i>L.</i>	Wild black Currant	Woods	General and common	In all woods.
76. <i>Tiarolla cordifolia</i> .— <i>L.</i>	Bishop’s Cap	Woods	General and common	In all woods.
77. <i>Carlyxylum Americanum</i> .—Schu.	Golden Saxifrage	Near springs	Very rare	W. R. Jones, Fr. Lewis, A. Jones.
<i>Saxifrageæ</i> .				
78. <i>Bilobus cynobatus</i> .— <i>L.</i>	Wild bilberry	Meadows and pastures	Rare	Fr. Lewis, A. Jones, L. Green.
79. <i>Bilobus beridum</i> .— <i>L.</i>	Wild black Beridum	Meadows and pastures	Rare	J. Gardinier, Fr. Lewis, A. Jones.
80. <i>Mitchella diphylla</i> .— <i>L.</i>	Bishop’s Cap	Woods	General and common	In all woods.
81. <i>Tiarolla cordifolia</i> .— <i>L.</i>	Live-for-ever	Woods	General and common	In all woods.
82. <i>Carlyxylum Americanum</i> .—Schu.	Golden Saxifrage	Near springs	Very rare	W. R. Jones, Fr. Lewis, A. Jones.
<i>Crassulaceæ</i> .				
83. <i>Venthorum eschscholtzii</i> .— <i>L.</i>	Ditch stone Crop	Meadows and pastures	Rare	Fr. Lewis, A. Jones, L. Green.
84. <i>Sedum telephium</i> .— <i>L.</i>	Live-for-ever	Meadows and pastures	Rare	J. Gardinier, Fr. Lewis, A. Jones.
<i>Homalocladiæ</i> .				
85. <i>Hamamelis Virginica</i> .— <i>L.</i>	Witch Hazel	Woods	General and common	In all woods.
<i>Eryngieæ Primulaceæ Family</i> .				
86. <i>Oenothera biennis</i> .— <i>L.</i>	Oenothera	Woods	General and common	In all woods.
87. <i>Oenothera biennis</i> .— <i>L.</i>	Common Oenothera	Woods	General and common	In all woods.
88. <i>Oenothera biennis</i> .— <i>L.</i>	Great Willow Herb	Thickets	Rare	E. Decker.
89. <i>Oenothera biennis</i> .— <i>L.</i>	Common evening Primrose	Meadows and pastures	General but scarce	On all farms.
90. <i>Oenothera biennis</i> .— <i>L.</i>	Common evening Primrose	Meadows and pastures	General but scarce	On all farms.

81. <i>Oenothera pumila</i> .— <i>L.</i>	Meadows and pastures, Ditches	Rare.....! N. Stafford (abundant), E. Decker.
* <i>Ludwigia palustris</i> .— <i>Elli.</i>	Water Purslane	Probably general but scarce. Fr. Lewis.
82. <i>Carum Carvi</i> .	“Parsley Family,” ² Caraway.....	Meadows and pastures, Rare
83. <i>Hydrocotyle Americana</i> .— <i>L.</i>	Penny-wort.....	Rare
84. <i>Sanicula Canadensis</i> .— <i>L.</i>	Black snake root (?)	General and common
85. <i>Sanicula Marylandica</i> .— <i>L.</i>	Black snake root	Rare
86. <i>Pastinaca sativa</i> .— <i>L.</i>	Common Parsnip	Meadows and pastures, General and common
87. <i>Conium maculatum</i> .— <i>L.</i>	Poison Hemlock	Rare
88. <i>Cryptotaenia Canadensis</i> .— <i>D. C.</i>	Hone-wort	General and common
89. <i>Osmorrhiza brevistylis</i> .— <i>D. C.</i>	Hairy-sweet Cicely	General and common
90. <i>Aralia racemosa</i> .— <i>L.</i>	“Ginseng Family,” ³ Spikenard	General but scarce
91. <i>Aralia nudicaulis</i> .— <i>L.</i>	Wild Sarsaparilla	General but scarce
92. <i>Aralia quinquefolia</i> .— <i>L.</i>	Ginseng	General but scarce
93. <i>Coronaria</i> .	“Dogwood Family,” ² Bunch berry	Rare
94. <i>Coronaria</i> .	Dog-wood	Rare
95. <i>Coronaria</i> .	Kinnikinnick	Probably general but scarce, E. Decker.
96. <i>Coronaria</i> .	Panicled cornel	Panicled cornel
97. <i>Linnaea borealis</i> .— <i>L. Her.</i>	Twin flower	“Honey-suckle Family,” ² Twin flower
98. <i>Diorvilia trifolia</i> .— <i>Moench.</i>	Bush honey-suckle	Woods,
99. <i>Sambucus Canadensis</i> .— <i>L.</i>	Common Elder	Meadows, pastures and fence-rows.
* <i>Sambucus pubens</i> .— <i>Michx.</i>	Red-berried Elder	Woods,
* <i>Viburnum Lantana</i> .— <i>L.</i>	Sweet Viburnum, Shep berry	Thickets
100. <i>Viburnum acerifolium</i> .— <i>L.</i>	Maple-leaved Arrow-wood	Woods,

B—Continued.

CLASSIFICATION.	Common Name.	Habitat.	Frequency.	Where found or noted.
" <i>Honey-suckle Family</i> ." Continued.				
101. <i>Viburnum lantana</i> .—Michx.	Wohle-Hash. Am. Way-faring Tree.	Woods,.....	General about Newville,....	Fr. Lewis, S. G. Spear, H. Haup., Edward Simms, W. Jones, C. Andrews, J. Hendricks, S. G. Stoor (Van Allen ten't), A. Decker, W. R. Stevens, H. N. Gris., L. Green.
" <i>Madder Family</i> ."				Fr. Lewis, J. E. Fox.
102. <i>Gaulium Mollugo</i> .—L.	Smooth Bed-straw	Pastures,.....	Rare (in country).....	In all woods.
103. <i>Gaulium asprellum</i> .—Michx.	Rough Bed-straw	Pastures,.....	Rare	W. R. Stevens, A. Peacock, Jacob Walrath, H. N. Gies.
104. <i>Gaulium trifidum</i> .—L.	Small Bed-straw	Meadows and pastures..	Rare	W. R. Stevens, A. Peacock, Jacob Walrath, H. N. Gies.
105. <i>Gaulium trifidum</i> .—Michx.	Sweet-scented Bed-straw.	Woods,.....	General and common	W. R. Stevens, A. Peacock, Jacob Walrath, H. N. Gies.
106. <i>Gaulium circaeans</i> .—Michx.	Wild Liquorice.	Woods,.....	Rare	W. R. Stevens, A. Peacock, Jacob Walrath, H. N. Gies.
107. <i>Gaulium lanceolatum</i> .—Tort.	Wild Liquorice.	Woods,.....	Rare	W. R. Stevens, A. Peacock, Jacob Walrath, H. N. Gies.
108. <i>Mitchella repens</i> .—L.	Partridge berry	Woods,.....	General and common	In all woods.
" <i>Teease Family</i> ."				
109. <i>Dipsacus Full-stem</i> .—L.	Fuller's Teasel.	Pastures,.....	Rare	Fr. Lewis, H. Peterie.
" <i>Compositae Family</i> ."				
110. <i>Eupatorium purpureum</i> .—L.	Trumpet Weed.	Pastures,.....	Rare	W. R. Stevens, A. Peacock, Fr. Lewis, S. G. Spear, H. Haup., J. E. Fox Smith ten't, D. Champion.
" <i>Thorough Wart, Bone-set</i> .				On all farms.
111. <i>Eupatorium perfoliatum</i> .—L.	Wet places,.....	General and common	In all woods.	
112. <i>Eupatorium aegyptiacum</i> .—L.	White Snake-root,.....	General and common	Evergreen, W. R. Stevens, A. Peacock, Jacob Walrath, H. N. Gies.	
113. <i>Thessalya Taraxacum</i> .—L.	Upland,.....	General and common	In all woods.	
" <i>Aster Family</i> ."				
114. <i>Aster eryngioides</i> .—Alt.	Woods,.....	General and common	A. Miller, F. Peacock, G. Hollinger, H. Haup., S. G. Spear, S. G. Spear, Edward Simms, J. J. Kirkard.	
115. <i>Aster macrophyllus</i> .—L.	Woods,.....	Very general and common.		

116. *Aster cordifolius.— <i>L.</i>	Fence-rows and woods	General and common	On all farms.
116. Aster puniceus.— <i>L.</i>	Meadows, pastures and woods	General and common	On all farms.
117. Aster simplex.— <i>Willd.</i>	Fence-rows	Probably general and common.	A. Miller, E. Decker, G. Belinger, H. Peterie, Jno. Snell.
*Aster acuminatus.— <i>Michx.</i>	Woods	Probably general and common.	Fr. Lewis.
*Aster Nova-Angliae.— <i>L.</i>	Roadsides	Rare	E. Decker, G. Bellinger, H. Peterie, Jno. Snell.
118. Erigeron Canadense.— <i>L.</i>	Horse-weed, Bitter-weed	Bare	A. Decker.
119. Erigeron Philadelphia.— <i>L.</i>	Flea-bane	Probably general but scarce	W. R. Stevens, Fr. Lewis.
120. Erigeron annuum.— <i>Pers.</i>	Sweet Flea-bane, Sweet Seabious	Meadows and pastures	On all farms.
121. Erigeron strigosum.— <i>Muhl.</i>	Daisy Flea-bane	Meadows and pastures	General and common
*Solidago cæstia.— <i>L.</i>	Daisy Flea-bane	Woods	Rare
Shaded ravines and woods		General and common	On all farms.
122. Solidago uliginosa.— <i>Ait.</i>	Sweet Goldenrod	Rare	W. R. Stevens, Fr. Lewis, S. G. Spoor, N. N. Schuyler, A. Decker, R. Lundt, S. G. Spoor (Van Allen ten' t).
*Solidago nemoralis.— <i>Ait.</i>	Common Cuckoo-hur	Rare	(G. Spoor, W. & R. Jones, N. N. Schuyler.
*Solidago gigantea.— <i>Ait.</i>	Common Elatostoma	General and common	E. Coville.
*Solidago lancolata.— <i>L.</i>	Common Elatostoma	Rare	On all farms.
123. Inula Ilicium.— <i>L.</i>	Common Elatostoma	General and common	E. Decker.
Roadsides, yards and grain-fields		General but scarce	On all farms except W. R. Stevens, A. Devendlorf, S. G. Spoor (Van Allen ten' t), L. Green, J. Ostrander; abundant on Fr. Lewis, D. Bellinger, H. Peterie, Ackerman (Donovan ten' t), Jos. Snell, Jno. Snell, J. Walter.
*Ambrosia artemisiifolia.— <i>L.</i>	Roman worm-wood, Hogweed, Bitter-weed	Rare	On all farms.
124. Xanthium strumarium.— <i>L.</i>	Common Cuckoo-hur	General but scarce	Fr. Lewis, A. Miller.
125. Kuddeka hirta.— <i>L.</i>	Common Cuckoo-hur	Rare	W. R. Stevens, A. Devendlorf.
*Helianthus strumosus.— <i>L.</i>	Jerusalem Artichoke	Rare	A. Jones.
*Helianthus tuberosus.— <i>L.</i>	Common Beggar's ticks	Rare	A. Schuyler.
126. Bidens frondosa.— <i>L.</i>	Meadows and pastures (in wet places)	General and common	On all farms.
*Bidens connata.— <i>Muhl.</i>	Wet places	Rare	J. Gardiner.

B—Continued.

CLASSIFICATION.	Common Name.	Habitat.	Frequency.	Where found or noted.
<i>Composita</i> —Continued.	" <i>Composite Family</i> "—Continued.			
* <i>Bidens erysanthemoides</i> .— <i>Michx.</i>	Bur-Marigold	Meadows and pastures..	Precariously general and common.	On all farms,
127. <i>Anthemis arvensis</i> .— <i>L.</i>	Corn Chamomile	Roadsides and grain-fields..	General but scarce.....	On all farms,
128. <i>Achillea Millefolium</i> .— <i>L.</i>	Common Yarrow, Milfoil..	Meadows and pastures..	General and common	Abundant on M. Wilkes, A. Miller.
129. <i>Leucanthemum vulgare</i> .— <i>L.</i>	White Daisy, Ox Eye,....	Meadows and pastures..	General and common	On all farms; abundant on M. Wilkes, E. Coville, D. Chapman, L. Devonport, Fr. Lewis, S. G. Spear,
130. <i>Tanacetum vulgare</i> .— <i>L.</i>	Common Tansy	Pastures.....	Rare	Fr. Lewis; S. G. Spear,
131. <i>Thapsia villosa</i> .— <i>L.</i>	Everlasting	Pastures	General and common	On all farms,
132. <i>Gnaphalium uliginosum</i> .— <i>L.</i>	Low Cupweed	Pastures	General and common	On all farms,
133. <i>Antennaria marginata</i> .— <i>R. Br.</i>	Pearly Everlasting	Pastures	General and abundant	On all farms,
134. <i>Antennaria plantaginifolia</i> .— <i>Hook.</i>	Plantain-leaved Everlasting.	Pastures	Probably general, but scarce.....	Scars on C. Hardox, J. W. Sturtevant, J. H. Obsander, W. & L. Jones; common on J. G. Snell, H. Petrie's, Jos. Steel, G. Shover, J. J. Richland, Askerman (Dovecote), A. Miller; abundant in pastures on E. Loeber, G. Billings, D. Bellinger,
135. <i>Ceratina Cyanea</i> .	Fire-weed	Pastures	Rare	A. Decker.
136. <i>Cirsium lanceolatum</i> .— <i>Scop.</i>	Blue-bottle	Pastures	Rare	A. Decker.
	Common Thistle	Meadows and pastures ..	General and common	On all farms; abundant on Fr. Lewis, E. Coville, W. R. Stevens,
137. <i>Cirsium heterophyllum</i> .— <i>Michx.</i>	Sweet Thistle	Woods	Rare	On all farms.
138. <i>Cirsium arvense</i> .— <i>Serp.</i>	Cat-tail Thistle	Meadows, pastures and grain-fields.	General and common	E. Barker, A. J. & S. Statford, G. Billinger, B. Kellinger.
139. <i>Lactuca sativa</i> .— <i>Graeb.</i>	Common Burdock	Pastures	General but scarce	W. R. Stevens,
140. <i>Lactuca sativa</i> .— <i>Michx.</i>	Large Hawkweed	Pastures	Rare	On all farms.
141. <i>Hieracium venosum</i> .— <i>L.</i>	Rattleback weed	Woods	Rare	E. Barker, A. J. & S. Statford,
142. <i>Hieracium patens</i> .— <i>L.</i>	Painted Hawkweed	Woods	Rare	W. R. Stevens,
				W. H. Jr., L. S. Simms.

143. <i>Nahitus albus</i> .— <i>Hook.</i>	Battletome root, White Woods.....	Probably general but scarce. H. Haupt, S. P. Jones, A. Jones.
	Lettuce.....	On all farms.
144. <i>Taraxacum Ions-leonis</i> .— <i>Derr.</i>	Common Dandelion.....	General and abundant.....
145. <i>Lactuca alouagata</i> .— <i>L.</i>	Wild Lettuce	General and common
146. <i>Mulgedium acuminatum</i> .— <i>D. C.</i>	Fence-tows	General but scarce.....
147. <i>Sonchus olereaceus</i> .— <i>L.</i>	Fence-tows	Bare
148. <i>Sonchus asper</i> .— <i>Vill.</i>	Common Saw Thistle	Grain-fields.....
149. <i>Lobelia siphilitica</i> .— <i>L.</i>	Spiny-leaved Sow Thistle, Great Lobelia.....	Grain-fields.....
150. <i>Lobelia inflata</i> .— <i>L.</i>	Indian Tobacco.....	Meadows and pastures.
	“Heath Family.” ²	
151. <i>Pyrola elliptica</i> .— <i>Nutt.</i>	Shin leaf.....	Woods.....
152. * <i>Pyrola ciliolata</i> .— <i>Swartz.</i>	Small pyrola.....	Woods.....
152. <i>Pyrola secunda</i> .— <i>L.</i>	One-sided pyrola.....	Woods.....
153. <i>Moneses uniflora</i> .— <i>L.</i>	One-flowered pyrola.....	Woods.....
154. <i>Chimaphila umbellata</i> .— <i>Nutt.</i>	Pipsissewa, Prince’s Pine.....	Woods.....
155. <i>Monotropa uniflora</i> .— <i>L.</i>	Indian pipe	Woods.....
	“Holly Family.” ³	
• <i>Aconitifoliaeae</i> .	Black Adler	Pastures.....
	“Ilex vermicillata.— <i>L.</i> , <i>Gray</i>	
156. <i>Plantago major</i> .— <i>L.</i>	“Plantain Family.” ²	Meadows and pastures.
157. <i>Plantago lanceolata</i> .— <i>L.</i>	Common Plantain.....	Meadows
	Rib grass, Rille grass,.....	
	“Primrose Family.” ²	
158. <i>Lysmachia stricta</i> .— <i>Ait.</i>	Pastures.....	Pastures.....
159. <i>Lysmachia ciliata</i> .— <i>L.</i>	Pastures.....	Pastures.....
	“Broom Rape Family.” ²	
160. <i>Cnephialis American</i> .— <i>Wallroth.</i>	Squaw or Cancer Root, Beech drops	Woods.....
* <i>Epiphagus Virginiana</i> — <i>Bart.</i>		Woods.....
	“Figwort Family.” ²	
161. <i>Verbasum Thapsius</i> .— <i>L.</i>	Common Mullein.....	Pastures.....
162. <i>Verbasum Blattaria</i> .— <i>L.</i>	Moth Mullein	Pastures.....

W. R. Stevens, A. Derendorf,
M. Wilkes, Fr. Lewis, Jacob
Walton, il. N. Gross,

On all farms,
W. R. Stevens,

B—Continued.

CLASSIFICATION.	Common Name.	Habitat.	Frequency.	Where found or noted.
<i>Schrophulariaceae</i> —Continued.	" <i>Pig-leat Family</i> ."			
* <i>Lunaria vulgaris</i> .— <i>Milkwort</i> .	Continued. Teal-thax, Rumstead, Butter and Eggs.	Door yards and roadsides	Rare	W. R. Stevens, D. Champion, J. H. Saunders, C. Andrews.
163. <i>Schrophularia nodosa</i> .— <i>L.</i>		Fence-rows	Probably general but scarce,	W. R. Stevens, Fr. Lewis, S. G. Spoor, G. Spoor, H. Haupt, S. P. Jones, J. J. Rickard.
164. <i>Minulus ringens</i> .— <i>L.</i>		Meadows and pastures (wet places).	General but scarce	Fr. Lewis, S. G. Spoor, H. Haupt, A. Jones, H. Green, P. Baum, J. E. Fox (Smith tent), N. N. Schuyler, N. N. Schuyler.
165. <i>Gratiola Virginiana</i> .— <i>L.</i>		Meadows and pastures (wet places).	Rare	
166. <i>Veronica Americana</i> .— <i>Schu.</i>	Amer. Brooklime	Meadows and pastures (wet places).	Rare	W. R. Stevens, J. J. Rickard, M. Wilkes.
167. <i>Veronica officinalis</i> .— <i>L.</i>	Common Speedwell	Pastures	Probably general but scarce.	W. R. Stevens, M. Wilkes.
168. <i>Veronica peregrina</i> .— <i>L.</i>	Purslane Speedwell, Neckweed.	Pastures	Rare	W. R. Stevens.
169. <i>Pedicularis Canadensis</i> .— <i>L.</i>	Common Lousewort, Wooly Batony.	Woods	Probably general but scarce.	W. R. Stevens.
* <i>Melampyrum Americanum</i> .— <i>Michx.</i>	Cow Kient	Woods	Probably general but disappears early.	W. R. Stevens.
" <i>Veronica Family</i> ."				
170. <i>Verbena hastata</i> .— <i>L.</i>	Blue Vervain	Pastures and roadsides.	General but scarce	Fr. Lewis, S. G. Spoor, H. Haupt, H. Green, P. Baum, A. Decker, R. Landt, E. Behnke, E. Dreher, G. Behnke, H. Bollinger, J. Rosenthal, H. Peterse, J. F. Reckel, G. Spoor, J. J. Rickard, A. Ackermann (Den van ten Os), H. N. Jones, A. Miller, L. Groot, J. Ostrander.
171. <i>Verbena stricta</i> .— <i>L.</i>				On all farms, general at common
				Pastures and White Vervain.

172. Phryma Leptostachya.— <i>L.</i>	Pastures.....	General and probably common.....	W. R. Stevens, A. Devendorf, H. N. Gross, S. G. Spoor, Jacob Walrath, F. Lewis, H. Haupt.
173. <i>Labiatae</i> .	“Mint Family.”		
174. <i>Mentha viridis</i> .— <i>L.</i>	Spearmint	Meadows and pastures (wet places).	General and common
175. <i>Mentha Piperita</i> .— <i>L.</i>	Peppermint	Meadows and pastures (wet places).	Probably general but scarce. W. R. Stevens, Fr. Lewis, S. G. Spoor, H. Haupt, M. Wilkes, A. Miller.
176. <i>Mentha Canadensis</i> .— <i>L.</i>	Wild Mint	Meadows and pastures (wet places).	Probably general but scarce. W. R. Stevens, Fr. Lewis, S. G. Spoor, H. Haupt, M. Wilkes, A. Miller, G. Spoor, H. Pe- terie, Jos. Snell.
177. <i>Lycopus Europaeus</i> .— <i>L.</i>	Wild Marjoram	Meadows and pastures (wet places).	General and common
178. <i>Origanum vulgare</i> .— <i>L.</i>	Wild Marjoram	Roadsides	Rare
179. <i>Calamintha Clinopodium</i> .— <i>Benth.</i>	*Calamintha Clinopodium.— <i>L.</i>	Woods	Rare
180. <i>Collomia Canadensis</i> .— <i>L.</i>	Rich-wood, Stone-root	Woods	General and common
181. <i>Hedonea pulegioides</i> .— <i>Perse</i>	Amer. Pennyroyal	Woods	Rare
182. <i>Monarda didyma</i> .— <i>L.</i>	Osageo tea	Woods	General
183. <i>Nepea cataria</i> .— <i>L.</i>	Catnip	Fence-rows and yards	Rare
184. <i>Prunella vulgaris</i> .— <i>L.</i>	Heal-all	Meadows and pastures	General but scarce
185. <i>Scutellaria laterifolia</i> .— <i>L.</i>	Mad-dog, Skull-cap	Pastures (wet places)	General and abundant
186. <i>Galeopsis Tetrahit</i> .— <i>L.</i>	Common Hemp-nettle	Fence-rows and yards	Rare
187. <i>Leonurus Cardiacus</i> .— <i>L.</i>	Common Mother-wort	Fence-rows and yards	General and common
188. <i>Boraginaceae</i> .	“Borage Family.”		
189. <i>Symptrium officinale</i> .— <i>L.</i>	Common Comfrey	Meadows and pastures (along a brook).	Rare
190. <i>Lithospermum officinale</i> .— <i>L.</i>	Common Gromwell	Pastures	Rare
191. <i>Echium spicatum</i> .— <i>Lamula</i> .— <i>Lehm.</i>	Stichseed	Pastures	Rare
192. <i>Cynoglossum officinale</i> .— <i>L.</i>	Common Hound's tongue	Pastures	General but scarce
193. <i>Cynoglossum Morisonii</i> .— <i>D. C.</i>	Beggar's Lice	Fence-rows and thickets	General but scarce
194. <i>Hydrophyllaceæ</i> .	“Water-leaf Family.” ³³		
195. <i>Hydrophyllum Virginicum</i> .— <i>L.</i>	Woods	Woods	Probably general and com- mon.
196. <i>Hydrophyllum Canadense</i> .— <i>L.</i>	Woods	Woods	Probably general but scarce. W. R. Stevens, Fr. Lewis, G. Spoor, N. N. Schuyler, A. Jones, A. J. Leekier, Eil. Simms, S. P. Jones, E. Decker.

B—Continued.

CLASSIFICATION.	Common Name.	Habitat.	Frequency.	Where found or noted.
* <i>Couvoliaceae</i> .	" <i>Convolutus Family</i> ."	Meadows, bogs and gar dens,	Rare	H. N. Gross, L. Gros (Ar. Jones, common).
* <i>Calystegia sepium</i> .— <i>R. Br.</i>	Hedge Bind-weed	Woods	Rare	Fr. Lewis.
<i>Solanaceae</i> .	" <i>Night-shade Family</i> ."	Fence-rows	Bare	W. R. Stevens, Jacob Wal Rath.
193. <i>Solanum nigrum</i> .— <i>L.</i>	Common Night-shade	Meadows, pastures and grain-fields.	General and abundant	On all farms.
<i>Apoynacee</i> .	" <i>Dog Rose Family</i> ."	Woods	Bare	W. R. Stevens, A. Devendorf.
194. <i>Apoynum cannabinum</i> .— <i>L.</i>	Indian Hemp	Fence-rows	Bare	W. R. Stevens, Fr. Lewis, S. G. "poor, H. Haupt, Edw. Simms, S. P. Jones.
<i>Asclepiadaceae</i> .	" <i>Milk-weed Family</i> ."	Woods	Probably general and com mon.	Jacob Wal Rath, A. Devendorf, H. N. Gross.
195. <i>Asclepias Curvata</i> .— <i>Dreissig</i>	Common Milk-weed	Woods	Bare	L. Green.
196. <i>Asclepias Phytoecia</i> .— <i>Pursh</i>	Poke Milk-weed	Woods	Prob. general but scarce.	W. R. Stevens, Fr. Lewis, S. G. "poor, H. Haupt, Edw. Simms, S. P. Jones.
<i>Oleaceae</i> .	" <i>Olive Family</i> ."	Woods	general but scarce	W. R. Stevens, A. Decker, E. Simms, A. Miller, W. & R. Jones.
* <i>Fraxinus Americana</i> .— <i>L.</i>	White Ash	Woods	general but scarce	On all farms.
197. <i>Fraxinus sambucifolia</i> .— <i>Lam</i>	Black Ash	Swamps	General but scarce	D. Bellinger.
198. <i>Aristolochiaceae</i> .	" <i>Birthwort Family</i> ."	Woods	General but scarce	On all farms.
<i>Phytolacaceae</i> .	" <i>Poke-Weed Family</i> ."	Fence-rows	General but scarce	On all farms.
199. <i>Phytolacca acinosa</i> .— <i>L.</i>	Potion Poke, or Snake target; Pigeon berry.	Barren yards	General but scarce	On all farms.
<i>Chenopodiaceae</i> .	" <i>Goosefoot Family</i> ."	Grain-fields	General but scarce	On all farms.
200. <i>Chenopodium album</i> .— <i>L.</i>	Pig weed, Lamb's-quarters	Grain-fields	General but scarce	On all farms.
201. <i>Atriplex hastata</i> .— <i>L.</i>	Pig-weed	Grain-fields	General but scarce	On all farms.
<i>Amaranthaceae</i> .	" <i>Amaranth Family</i> ."	Grain-fields	Rare	Fr. Lewis.
202. <i>Amaranthus retroflexus</i> .— <i>L.</i>	Pig-weed	Grain-fields	General and common	On all farms.
<i>Polygonaceae</i> .	" <i>Buckwheat Family</i> ."	Grain-fields	Rare	Fr. Lewis.
203. <i>Polygonum persicaria</i> .— <i>L.</i>	Lady's Thumb	Grain-fields	General and common	On all farms.
* <i>Polygonum Persicaria</i> .— <i>Forst.</i> .....	....	....	....	....

204. Polygonum <i>Hydrojaponer</i> .— <i>L.</i>	Smart <i>Wool</i> .	Wet places.	General and common	On all farms,
205. Polygonum <i>Virginianum</i> .— <i>L.</i>	Woods.	Woods.	Rare	A. Decker.
206. Polygonum <i>avicularia</i> .— <i>L.</i>	Knot grass, Door-weed	Pastures and yards	General and common	On all farms.
207. Polygonum <i>avicularia</i> .				
208. Polygonum <i>sagittatum</i> .— <i>L.</i>	Arrow-leaved Tear-thumb	Yards	General and common	On all farms,
209. Polygonum <i>convolvulus</i> .— <i>L.</i>	Black bind-weed	Wet places, grain-fields	Rare	A. Decker.
210. Polygonum <i>elatineoides</i> .— <i>Mitch.</i>	Thickets	Thickets	General and common	On all farms,
211. Rumex <i>crispus</i> .— <i>L.</i>	Curled Duck	Meadows and pastures	Rare	G. Bellinger.
212. Rumex <i>obtusifolius</i> .— <i>L.</i>	Bitter Dock	Meadows and pastures	General and common	On all farms.
213. Rumex <i>Acetosella</i> .— <i>L.</i>	Field or Sheep Sorrel	Meadows and pastures	General but scarce	On all farms.
*Lindera <i>Benzoin</i> .— <i>Meissner</i> .	<i>Laurel Family</i> , ?	Woods	Probably general but scarce	N. N. Schuyler.
214. Calitrichia <i>vernalis</i> .— <i>L.</i>	<i>Water Starwort Fam.</i> , ?	Ditches	Rare	L. Green.
		Pastures	Rare	L. Green.
*Calitrichia <i>heterophylla</i> .— <i>Pursh</i> .				
215. Euphorbia <i>hyperoleia</i> .— <i>L.</i>	<i>Euphorbiaceen.</i>	Pastures	Rare	A. Jones, N. N. Schuyler, M.
				Wilkes, Fr. Lewis.
				A. Jones, Fr. Lewis.
216. Euphorbia <i>maculata</i> .— <i>L.</i>	<i>Spurge Family</i> , ?	Pastures	Rare	On all farms.
217. Acalypha <i>Virginia</i> .— <i>L.</i>	Large spotted Spurge	Pastures	General and common	
218. Urtica <i>grauis</i> .— <i>Ait.</i>	Spotted Spurge	Pastures and grain-fields	(General and common)	
			General but scarce	
219. Urtica <i>urens</i> .— <i>L.</i>	<i>Urticaceae</i> .	Fence-tows	Rare	
220. Imporeia <i>Canadensis</i> .— <i>Gaudich.</i>	Small stinging Nettle	Barnyards	General and common	
221. Pilea <i>pumila</i> .— <i>Gray</i>	Wood Nettle	Woods	General but scarce	
		Shady wet places and woods		
222. Cannabis <i>sativa</i> .— <i>L.</i>		Roadsides and barnyards	Rare	J. E. Fox, near Newville Cheese Factory.
223. Illumula <i>Lupulina</i> .— <i>L.</i>	Hop	Fence-tows	Rare	W. R. Stevens.
*Juglans <i>cineraria</i> .— <i>L.</i>	<i>Walnut Family</i> , ?	Meadows, pastures and woods	Probably general but scarce	W. R. Stevens, A. Davenport, M. Wilkes, A. D. Hess, C. Andrews, Fr. Lewis.

B—Continued.

CLASSIFICATION.	Common Name.	Habitat.	Frequency.	Where found or noted.
*Juglandaceæ—Continued.	"Walnut Family"—Continued.			
*Carya alba.— <i>L.</i>	Shell-bark or Shag-bark Hickory.	Woods,	Rare	W. R. Stevens, A. Deverdorff, M. Wilkes (only on river road).
*Carya amara.— <i>Nutt.</i>	Bitter-nut or Swamp Hickory.	Woods,	Rare	W. R. Stevens, H. N. Green (only on river road).
<i>Cephaelis.</i>	"Oak Family,"			
*Quercus alba.— <i>L.</i>	White Oak,	Woods,	Rare	W. R. Stevens, A. Deverdorff (river road only).
*Quercus rubra.— <i>L.</i>	Red Oak,	Woods,	Rare	W. R. Stevens, A. Deverdorff, A. Jones, N. N. Schuyler.
*Fagus ferruginea,— <i>Ait.</i>	American Beech,	Mead., w., pastures, grain-fields and woods.	General and common,	On all farms.
*Fraxinus Virginiana,— <i>Willd.</i>	Am. Hop, Hornbeam, Ironwood.	Woods,	General and common,	On all farms.
224. <i>Carpinus Americana</i> .— <i>Michx.</i>	Am. Hornbeam, Blue or Water Beech.	Woods,	General and common,	On all farms.
<i>Betulaceæ.</i>	"Birch Family,"			
*Betula lenta.— <i>L.</i>	Black Birch,	Woods,	General and common,	On all farms.
<i>Salicaceæ.</i>	"Willow Family,"			
225. <i>Salix humilis</i> .— <i>Marshall</i> ,	Low bush Willow,	Along streams and wet places.	General and common,	On all farms.
226. <i>Salix sericea</i> .— <i>Marshall</i> ,	Silky-leaved Willow,	Along streams and wet places.	General and common,	On all farms.
227. <i>Salix cordata</i> .— <i>Marshall</i> ,	Heart-leaved Willow,	Along streams and wet places.	General and common,	On all farms.
228. <i>Salix alba</i> .— <i>L.</i>	White Willow,	Along streams and wet places.	General and common,	On all farms.
229. <i>Pyrus trichocarpa</i> .— <i>Michx.</i>	American Aspen,	Pastures and woods,	Rare	S. G. Spoor, L. Green.
<i>Pinaceæ.</i>	"Pine Family,"			
*Pinus strobus.— <i>L.</i>	White Pine,	Woods,	Rare	W. R. Stevens, A. Deverdorff, J. C. Walrath.

230.	<i>Abies balsamea</i> .— <i>Mitchx.</i>	Hemlock Spruce.....	Woods, swamps and woods.....	General and very common ..!	In all woods,
231.	<i>Thuja occidentalis</i> .— <i>L.</i>	Am. Arbor vitis.....	Rare	W. R. Stevens, H. N. Gros.	
231.	<i>Taxus baccata</i> .— <i>L.</i>	Ground Hemlock, American Yew.	Woods.....	W. R. Stevens, Fr. Lewis, S. G., Spoor, H. Haupt, E. Simius, S. P. Jones, Jos. Snell.	
232.	<i>Arisema triphyllum</i> .— <i>Tort.</i>	“ <i>Aram Family.</i> ”	Woods.....	Probably general but scarce.	W. R. Stevens, Jacob Wal-rath, H. N. Gros, A. Devendorf, Fr. Lewis, S. G., Spoor, A. Decker, Edward Simms, S. P. Jones, G. Bellinger, D. Bellinger, Jos. Snell.
233.	<i>Symplocarpus foetidus</i> .— <i>Salisb.</i>	Skunk Cabbage.....	Meadows, pastures and bogs.	Rare	W. R. Stevens, Jacob Wal-rath, H. N. Gros, A. Devendorf, Fr. Lewis, S. G., Spoor, A. Decker, Edward Simms, S. P. Jones, G. Bellinger, D. Bellinger, Jos. Snell.
234.	<i>Lemna minor</i> .— <i>L.</i>	“ <i>Duck-Weed Family.</i> ”	Ditches (floating).....	Rare	H. N. Gros, L. Green, Mrs. Devendorf (Briggs' ten't), A. Decker; abundant on A. Devendorf.
235.	<i>Lemna polyrhiza</i> .— <i>L.</i>	Common Cat-Tail	Ditches (floating).....	Rare	H. N. Gros, L. Green, Mrs. Devendorf (Briggs' ten't); abundant on A. Devendorf.
236.	<i>Typha latifolia</i> .— <i>L.</i>	“ <i>Cat-Tail Family.</i> ”	Wet places	Rare	A. Decker, Mrs. Devendorf (Briggs' ten't), Fr. Lewis, S. G., Spoor.
237.	<i>Sparganium eurycarpum</i> .— <i>Engelm.</i>	Common Cat-Tail	Wet places	Rare	H. N. Gros, L. Green, J. E. Fox (Smith tent), Mrs. Devendorf (Briggs' ten't).
238.	<i>Sparganium simplex</i> .— <i>Huds.</i>	“ <i>Water Plantain Family.</i> ”	Wet places	Rare	H. N. Gros.
		<i>Alismaceæ.</i>	Water Plantain	Ditches and wet places.	H. N. Gros.
239.	<i>Sagittaria variabilis</i> .— <i>Engelm.</i>	“ <i>Orchidaceæ.</i> ”	Ditches and wet places.	Rare	H. N. Gros.
240.	<i>Habenaria hyperborea</i> .— <i>R. Br.</i>	“ <i>Orchis Family.</i> ”	Woods	Rare	Fr. Lewis.
241.	<i>Habenaria Hookeri</i>	Woods	Rare	W. R. Stevens.	
242.	<i>Habenaria pseudodes</i> .— <i>Gray.</i>	Swamps	Rare	L. Green.	
		“ <i>Habenaria flavia</i> ”.....	Meadows	Rare	L. Green.

B—Continued.

Classification,	Common Name.	Habitat.	Frequency.	Where found or noted.
<i>Orchidaceae</i> —Continued.				
243. <i>Grosmeyera repens</i> .— <i>R. Br.</i>	Woods.....	General but scarce	Bare	W. R. Stevens, A. Devendorf.
* <i>Grosmeyera palloscens</i> .— <i>R. Br.</i>	Woods.....	Rare	Near Flaks basin Cheese Factory.	
244. <i>Spiranthes heterotricha</i> .— <i>Torrey</i>	Pastures (wet places)....	Rare		
245. <i>Polygonia verticalis</i> .— <i>Nutt.</i>	Woods.....	Rare		
* <i>Cypripedium pubescens</i> .— <i>Willd.</i>	Large yellow Lady's-slipper Woods.....	Rare		
246. <i>Sisyrinchium campestre</i> .— <i>L.</i>	Meadows	Rare		
“ <i>Orechis Family</i> ”—Continued.				
247. <i>Smilax herbacea</i> .— <i>L.</i>	Fence-rows	Rare	W. R. Stevens, ...	
248. <i>Trillium erectum</i> .— <i>L.</i>	Woods	General and common	Jacob Walrath, Fr. Lewis, S. G. Spoor, H. Haupt.	
249. <i>Trillium grandiflorum</i> .— <i>Salish</i> , ...	Woods.....	Rare	H. N. Gross.	
250. <i>Melica Virgata</i> .— <i>L.</i>	Int. Cucumber Root ,... ,	Probably general but scarce.	Fr. Lewis, S. G. Spoor, H. Haupt, Edward Simms, S. P. Jones.	
251. <i>Uvularia grandiflora</i> .— <i>Smith</i>	Large flowered Bellwort ..	Probably general but scarce.	W. R. Stevens, Fr. Lewis, S. G. Spoor, H. Haupt, E. Decker, A. Decker.	
252. <i>Uvularia sessilifolia</i> .— <i>L.</i>	Sessile-leaved Bellwort ..	Rare	E. Decker, A. Decker.	
253. <i>Sisyrinchium campestre</i> .— <i>W. Andr.</i>	Woods.....	Rare	H. Lewis.	
254. <i>Polygonatum multiflorum</i> .— <i>Dichot.</i>	Woods.....	Rare	W. R. Stevens.	
255. <i>Smilacina racemosa</i> .— <i>Desf.</i>	False Spikenard	Probably general but scarce.	W. R. Stevens, A. Devendorf, Fr. Lewis, H. Haupt, S. G. Spoor, E. Decker.	
256. <i>Spathiphyllum</i> .— <i>Ker.</i>	Two-leaved Liliy, -Seal Woods	Probably general but scarce.	W. R. Stevens, A. Devendorf, Fr. Lewis, H. Haupt, S. G. Spoor, E. Decker, A. James, A. Pecker, W. R. Stevens, L. Green.	
257. <i>Lilium P. williamsii</i> .— <i>L.</i>	Wild-tartarred Lily.....	Rare		
258. <i>Lilium Canadense</i> .— <i>L.</i>	Wild yellow Lily.....	Rare		
	Meadows	Rare		
				L. Green.

Juniper.	" <i>Rush Family.</i> "	Meadows and pastures (wet places).	General but scarce
259. <i>Juniperus effusa</i> .— <i>L.</i>	Common or soft rush.	Rare	On all farms,
260. <i>Juniperus effusa</i> , var. <i>conglomeratus</i> .	Readsides.	General and common	Near Fink's basin.
261. <i>Juniperus effusa</i> , var. <i>gracilis</i>	Ieadsides.	Rare	I. Green, H. N. Gros.
262. <i>Juniperus horizontalis</i> .— <i>L.</i>	Pastures.	W. R. Stevens, near Fink's basin.	W. R. Stevens, near Fink's basin.
263. <i>Juniperus tenuis</i> .— <i>Wild.</i>	Meadows and pastures	General and common	On all farms.
<i>Cyperaceae.</i>	" <i>Sedge Family.</i> "		
264. <i>Cyperus papyrus</i> .— <i>Muhl.</i>	Gardens	Rare	H. N. Gros.
* <i>Cyperus diandra</i> .— <i>Torr.</i>	Pastures (wet places)	Rare	Fr. Lewis.
265. <i>Cyperus surigenus</i> .— <i>L.</i>	Pastures (wet places)	General and common	On all farms,
266. <i>Eleocharis obtusa</i> .— <i>Schultes</i>	Meadows, pastures and wet places.	General and common	On all farms,
267. <i>Eleocharis palustris</i> .— <i>R. Br.</i>	Wet places.	General and common	On all farms,
268. <i>Scirpus validus</i> .— <i>Fahl</i>	Wet places.	Rare	H. N. Gros, L. Green, Mrs. Devendorf (Briggs test.).
269. <i>Scirpus erythrorhynchus</i> .— <i>L.</i>	Meadows and wet places.	Rare	L. Green.
270. <i>Scirpus acutirostris</i> .— <i>Muhl.</i>	Meadows and pastures.	General and common	On all farms,
271. <i>Scirpus lineatus</i> .— <i>Muhl.</i>	Meadows and wet places.	Rare	A. J. A. S. Stafford.
272. <i>Scirpus Eriophorum</i> .— <i>Mehr.</i>	Meadows and pastures.	General and common	On all farms,
273. <i>Carex polytrichoides</i> .— <i>Muhl.</i>	Wet places	Probably general and com- mon.	Near Fink's basin.
274. <i>Carex teretiscula</i> .— <i>Gord.</i>	Meadows and pastures.	General and common	On all farms,
275. <i>Carex vuljinotidea</i> .— <i>Mittel.</i>	Meadows and pastures.	General and common	On all farms,
276. <i>Carex parvanoidea</i> .— <i>Muhl.</i>	Meadows	Rare	W. R. Stevens, A. Devendorf.
277. <i>Carex capillaris</i> .— <i>Boat.</i>	Meadows	Rare	A. Devendorf.
278. <i>Carex rosea</i> .— <i>Schlecht.</i>	Meadows and Woods	Probably general but scarce.	W. R. Stevens, A. Devendorf, L. Green, Jacob Waldrath, H. N. Gros.
279. <i>Carex rosea</i> , var. <i>radiata</i> .— <i>Dew.</i>	Meadows, pastures, woods and bogs.	Meadows	W. R. Stevens, H. N. Gros, L. Green.
280. <i>Carex Deweyana</i> .— <i>Muhl.</i>	Woods	Meadows and pastures (wet places).	W. B. Stevens, A. Devendorf.
281. <i>Carex scoparia</i> .— <i>Schr.</i>	Meadows	Meadows	On all farms,
282. <i>Carex scoparia</i> , var. (?)			A. Devendorf.
283. <i>Carex straminea</i> .— <i>Nak.</i>			Jno. Smith.
284. <i>Carex straminea</i> , var. <i>lypia</i> .— <i>Boat.</i>			On all farms.
285. <i>Carex crinita</i> .— <i>Lam.</i>			Ed. Simms, A. J. & S. Staf- ford.

B—Continued.

CLASSIFICATION.	Common Name.	Habitat.	Frequency.	Where found or noted.
<i>Cyperaceæ</i> —Continued.	"Sedge Family"—Continued.			
285. Carex granularis.— <i>Muhl.</i>	Pastures,.....	Rare		A. Devendorf, Jacob Walrath, L. Green, H. N. Gross,
287. Carex pallens.— <i>L.</i>	Meadows	Rare		A. Devendorf,
288. Carex graciliflora.— <i>S. Wur.</i>	Pastures,.....	Rare		L. Green, H. N. Gross (common on both).
289. Carex plantaginea.— <i>Lam.</i>	Woods	General and common ,.....		In all we is about Newville.
290. Carex laxiflora.— <i>Lam.</i>	Woods	Probably general and common ,.....		W. R. Stevens,
291. Carex laxiflora, var. <i>plantaginea</i> .— <i>Boott</i>	Woods	Probably general and common ,.....		W. R. Stevens,
292. Carex Hitchcockiana.— <i>Dew.</i>	Woods	General but scarce		W. R. Stevens, Jacob Walrath,
293. Carex Pennsylvania.— <i>Lam.</i>	Woods	Rare		Fr. Lewis, R. Landt, A.
294. Carex atrocincta.— <i>Boott</i>	Woods	Rare		Decker,
295. Carex hystrixina.— <i>Willd.</i>	Meadows and pastures (wet places).	General but scarce		H. N. Gross, L. Green, W. R. Stevens, A. Devendorf, Fr. Lewis, H. Haupt, S. G., Spurr, J. E. Fox (Smith var.), D. Bellinger,
296. Carex tenerula.— <i>Muhl.</i>	Meadows and pastures (wet places), swamps	General but scarce		(On all farms,
297. Carex bullata.— <i>Muhl.</i>	Swamps	Rare		L. Green,
298. Carex petraea.— <i>Schre.</i>	Swamps	Rare		L. Green,
	"Grass Family."			
299. Leersia oryzoides.— <i>Spartz</i>	Rice Cut grass.....	General and common ,.....		On all farms,
... "Pennisetum."— <i>L.</i>	Timothy	General and abundant		On all farms,
300. "Alopecurus."— <i>Thunb.</i>	Reed grass	Rare		R. Stevens,
301. Agrostis vulgaris.— <i>Benth.</i>	Red Top	General and abundant		On all farms,
302. Agrostis alba.— <i>L.</i>	Floren or White Bent grass	Meadows and pastures		H. N. Gross,
303. Agrostis scabra.— <i>Willd.</i>	Hair-grass	Meadows and pastures		On all farms,
304. Cladium mariscus.— <i>L.</i>				
305. Maianthemum canadense.— <i>Tyr.</i>	Woods	Rare		A. Decker,
				E. Becker, N. N. Schuyler,
				F. Lew.

303.	<i>Brachyleptrum aristatum</i> .— <i>Bauer</i> .	Drop. seed, Nimble Will.	Pastures and woods.....	Rare	M. Wilkes, — Peck.
307.	<i>Oryzopsis asperifolia</i> .— <i>Mitch</i> .	Woods.....	Woods.....	Rare	W. R. Stevens.
308.	<i>Oryzopsis melanocarpa</i> .— <i>Muhl</i> .	Woods.....	Woods.....	Rare	W. R. Stevens, A. Devendorf.
309.	<i>Dactylis glomerata</i> .— <i>L.</i>	Cock's foot, Orchard grass.	Pastures.....	Rare	A. J. & S. Bradford.
310.	<i>Eatonia Pennylvanica</i> .— <i>Raf</i>	Wet places	Wet places	General but scarce.....	W. R. Stevens, II. Green.
					W. R. Stevens, A. Devendorf, Fr. Lewis.
311.	<i>Glyceria nervata</i> .— <i>Trib</i> .	Wet places	General and common.....	On all farms.....	On all farms.
312.	(<i>Glyceria aquatica</i> .— <i>Smi</i> h.)	Reed meadow grass	(general but scarce.....)	On all farms.....	On all farms.
313.	<i>Glyceria fluitans</i> .— <i>R. Br</i> .	Meadows and pastures	Meadows and pastures	Rare	A. Decker.
314.	<i>Poa annua</i> .— <i>L.</i>	Low spear grass	Pastures and yards.....	General but scarce	On all farms.
315.	<i>Poa compressa</i> .— <i>L</i>	Wire or blue grass, Kentucky blue grass.	Meadows and pastures	General and common	On all farms.
316.	<i>Poa scutellata</i> .— <i>Ehrhart</i>	False Red Top, Foul meadow grass.	Meadows and pastures	General and common	General and abundant
317.	<i>Poa pratensis</i> .— <i>L</i>	Green or Common Meadow Grass.	Meadows and pastures	General and abundant	On all farms.
318.	<i>Poa trivialis</i> .— <i>L</i>	Rough meadow grass	Wet places.....	Rare	Near Fink's basin.
319.	<i>Poa hungarica</i> .— <i>Natt</i>	Woolly grass	Woods.....	Rare	W. R. Stevens, A. Devendorf.
320.	<i>Festuca ovina</i> .— <i>L</i>	Sheep's fescue grass	Pastures.....	Rare	W. R. Stevens.
321.	<i>Festuca ovina</i> , var. (?)	Couch, Quie, Quack or Quitch grass.	Meadows and pastures	Rare	W. R. Stevens.
322.	<i>Festuca elatior</i> , var. pratinensis.— <i>L</i> .	Wild Oat grass	Woods.....	General and common	On all farms.
323.	<i>Festuca nutans</i> .— <i>Will</i>		Meadows and pastures	General but scarce	W. R. Stevens, Jacob Wal-rath.
324.	<i>Cynosurus cristatus</i> .— <i>W</i> .	Crested Dog's Tail.....	Pastures	Rare	W. R. Stevens.
325.	<i>Bromus secalinus</i> .— <i>L</i> .	Cheat or Chess.....	Meadows	Rare	J. Wagner (among wheat).
326.	<i>Bromus racemosus</i> .— <i>L</i> .	Upright Chess.	Meadows, pastures and grain-fields.	Rare	W. R. Stevens.
327.	<i>Triticum repens</i> .— <i>L</i>	Couch, Quie, Quack or Quitch grass.	General and common	General and common	On all farms.
328.	<i>Gymnosiphon Hystrix</i> .— <i>Schreb</i>	Wild Oat grass	Woods	Rare	W. R. Stevens.
329.	<i>Danthonia spicata</i> .— <i>Bentz</i>		Woods	Rare	W. R. Stevens.
330.	<i>Danthonia compressa</i> .— <i>C. F. A</i>		Woods	Rare	A. Devendorf.
331.	<i>Avena striata</i> .— <i>Mitch</i> .		Woods	Rare	W. R. Stevens.
332.	<i>Trisetum subspicatum</i> ,		Pastures	Rare	W. R. Stevens.
	var. molle.— <i>Bentz</i> .		Meadows and pastures	Rare	W. R. Stevens.
333.	<i>Aira caespitosa</i> .— <i>L</i>	Sweet vernal grass	Pastures	General and abundant	W. R. Stevens, J. J. Rickardt.
334.	<i>Anthoxanthum odoratum</i> .— <i>L</i>	Common Crab or Finger grass.	Woods	General and common	On all farms.
335.	<i>Panicum sanguinale</i> .— <i>L</i>	Old witch grass	Grain-fields	Rare	W. R. Stevens.
336.	<i>Panicum capillare</i> .— <i>L</i> ,		Woods	General and common	W. R. Stevens.
337.	<i>Panicum latifolium</i> .— <i>L</i> .			Rare	W. R. Stevens.

B—Continued.

CLASSIFICATION.	Common Name,	Habitat.	Frequency.	Where found or noted.
<i>Gramineae</i> —Continued.				
338. <i>Panicum dichotomum</i> .— <i>L</i>	" <i>Grass Family</i> "—Cont'd.	Pastures.....	Rare.....	E. Decker, M. Wilkes, S. Miller, E. Coville.
339. <i>Panicum depauperatum</i> .— <i>Muhl</i>		Meadows.....	Rare.....	W. R. Stevens.
340. <i>Panicum Crousz-galli</i> .— <i>L</i>		Yards and grain-fields.....	General and common.....	on all farms.
341. <i>Setaria glauca</i> .— <i>Bentz</i>		Meadows, pastures and grain-fields.....	General and abundant.....	on all farms.
342. <i>Setaria viridis</i> .— <i>Bentz</i>		Pastures and grain-fields.....	General but scarce.....	On all farms.
<i>Equisetaceæ</i> .				
343. <i>Equisetum arvense</i> .— <i>L</i>	" <i>Horse Tail Family</i> "	Grain-fields and woods..	Probably general but scarce.	F. Lewis, S. G. Spoor, H. Haupt, W. R. Stevens, A. Decker, E. Decker, G. Bellinger.
	Common Horse-tail.....			E. Decker, H. N. Gros, L. Green, Fr. Lewis, H. Haupt.
344. <i>Equisetum sylvaticum</i> .— <i>L</i>		Woods.....	Rare.....	In all woods.
345. <i>Equisetum laeve</i> .— <i>L</i>		Ditches.....	Rare.....	W. R. Stevens, H. Haupt, N. N. Schuyler.
• <i>Equisetum hyemale</i> .— <i>L</i>		Woods.....	Rare.....	W. R. Stevens, Jacob Walrath, H. Haupt, Ed. Simms, R. Lanier.
	" <i>Ferns</i> "			W. R. Stevens, Jacob Walrath, A. Jones, H. Haupt, S. G. Stevens, Fr. Lewis, Edward Stevens, A. Decker, R. Lanier.
346. <i>Athyrium filix-femina</i> .— <i>L</i>	<i>Maiden's Hair</i>	Woods.....	General and common.....	W. R. Stevens, Jacob Walrath, A. Jones, H. Haupt.
347. <i>Pteris aquilina</i> .— <i>L</i>	Common Brake.....	Thickets and woods.....	General but scarce	S. G. Spoor, Fr. Lewis, A. Decker, R. Lanier, E. Bellinger.
348. <i>Asplenium austro-titulum</i> .— <i>Michx.</i>		Woods.....	Rare	W. R. Stevens, Fr. Lewis, A. Decker, R. Lanier, E. Bellinger.
349. <i>Asplenium thelypterides</i> .— <i>Michx.</i>		Woods.....	General and common.....	Probable general but scarce.
350. <i>Asplenium Filix-femina</i> .— <i>Burm</i>		Woods.....	Woods.....	W. R. Stevens, Fr. Lewis, S. G. Spoor, H. Haupt, S. G. Stevens, Fr. Lewis, A. Decker, R. Lanier, E. Bellinger.
351. <i>Phlegmites heracifolius</i> .— <i>Fée</i>				W. R. Stevens, Fr. Lewis.
352. <i>Phragmites Propinquus</i> .— <i>Fée</i>				

•Aspidium Thelypteris.— <i>Swartz</i>	Woods.....	Rare	Fr. Lewis, S. G. Spoor, A. Decker.
353. Aspidium Noreboracense.— <i>Swartz</i>	Woods.....	Rare	Fr. Lewis, S. G. Spoor, H. Haupl.
354. Aspidium spinulosum.— <i>Swartz</i>	Woods.....	Probably general and common.	Fr. Lewis, S. G. Spoor, H. Haupl, R. Landt, A. Decker, W. R. Stevens.
355. Aspidium Goldianum— <i>Hook</i> , var. (?)	Woods.....	Rare	Fr. R. Stevens.
356. Aspidium marginale.— <i>Swartz</i>	Woods.....	Rare	Fr. Lewis, W. R. Stevens, H. Haupl, S. G. Spoor, Ed. Simms, E. Decker, G. Bellinger.
357. Aspidium acrostichoides.— <i>Swartz</i>	Woods.....	Rare	Fr. Lewis, H. Haupl, S. G. Spoor, A. Decker, R. Landt.
358. Cystopteris bulbifera.— <i>Burm</i>	Shaded ravines and wood's	Probably general and common.	Fr. Lewis, S. G. Spoor, H. Haupl, A. Decker, Ed. Simms, S. P. Jones.
359. Struthiopteris Germanica.— <i>Willd</i>	Meadows and pastures (wet places).	Probably general but scarce.	Fr. R. Stevens, A. Devendorf, Fr. Lewis, S. G. Spoor, H. Haupl, A. Decker.
360. Onoclea sensibilis.— <i>L</i>	Damp thickets and woods	Probably general but scarce.	W. R. Stevens, Jacob Wal-rath, Fr. Lewis, S. G. Spoor, H. Haupl, A. Decker, S. G. Spoor ('Van Allen tau't), A. Decker, Edward Simms, A. Jones, E. Decker, G. Bellinger.
361. Dicksonia punctilobula.— <i>Kunze</i>	Pastures and dry thickets	Rare	L. Green, H. N. Gros.
			L. Green.
362. Osmunda regalis.— <i>L</i>	Swamps	Rare	L. Green, near Fink's basin.
363. Osmunda Claytonia.— <i>L</i>	Swamps	Rare	W. R. Stevens, A. Devendorf, Jacob Wairath.
*Osmunda cinnamomea.— <i>L</i>	Swamps	Probably general and common.	J. J. Rickardt.
364. Botrychium Virginicum.— <i>Swartz</i>	Woods.....	Rare	
*Botrychium lunariaeoides.— <i>Swartz</i>			
365. Lycoptodium lucidulum.— <i>Dich</i>	"Club Moss Family," Woods.....	Rare	W. R. Stevens.
366. Lycoptodium clavatum.— <i>L</i>	Woods.....	Rare	W. R. Stevens.
*Selaginella selaginoides.— <i>Grevy</i>	Woods.....	Rare	Near Fink's basin, W. R. Stevens.

REPORT ON GRASSES CONSTITUTING THE HAY.

[This mark (*) denotes that a trace only of Ergot was discernible.]

FOUND WITH ERGOT (CLAVICER'S PURPURA—TULS) UPON THEM.		UNAFFECTED WITH ERGOT.	
Per cent of Grass.	EREOCHARYNS P-A-	Per cent of Grass.	EREOCHARYNS P-A-
Per cent Bracteas.	PHTHEAEIN P-RA-	Per cent of Grass.	PHTHEAEIN P-RA-
Per cent Bracteas.	PHLEUM P-RA-	Per cent of Grass.	PHLEUM P-RA-
Per cent of Grass.	AGROSTIS L-ESSES.	Per cent of Grass.	AGROSTIS L-ESSES.
Per cent Bracteas.	GARNS.	Per cent of Grass.	GARNS.
Per cent Bracteas.	VET.	Per cent of Grass.	VET.
Per cent of Grass.	GLYC-EHIA SER-	Per cent of Grass.	GLYC-EHIA SER-
Per cent Bracteas.	GARNS.	Per cent of Grass.	GARNS.
Per cent of Grass.	POA SEQUITIA.	Per cent of Grass.	POA SEQUITIA.
Per cent Bracteas.	POA PRATENSIS.	Per cent Bracteas.	POA PRATENSIS.
Per cent of Grass.	FESTUCA HILA-	Per cent of Grass.	FESTUCA HILA-
Per cent Bracteas.	DROSES SECALI-	Per cent of Grass.	DROSES SECALI-
Per cent of Grass.	TRITICUM HE-	Per cent of Grass.	TRITICUM HE-
Per cent Bracteas.	DANTHONIA SP1-	Per cent of Grass.	DANTHONIA SP1-
Per cent of Grass.	CATA.	Per cent Bracteas.	CATA.
Per cent of Grass.	THYROLEIUM PRA-	Per cent of Grass.	THYROLEIUM PRA-
Per cent of Grass.	DACTYLIS GLO-	Per cent of Grass.	DACTYLIS GLO-
Per cent of Grass.	GRASSA.	Per cent of Grass.	GRASSA.
Per cent of Grass.	MILHATA.	Per cent of Grass.	MILHATA.
Per cent of Grass.	TILI-A.	Per cent of Grass.	TILI-A.
Per cent of Grass.	AGROSTIS SC-A-	Per cent of Grass.	AGROSTIS SC-A-
Per cent of Grass.	TRITICELUM HE-	Per cent of Grass.	TRITICELUM HE-
Per cent of Grass.	TRITICUM HE-	Per cent of Grass.	TRITICUM HE-
Per cent Bracteas.	GRASSA.	Per cent Bracteas.	GRASSA.
Per cent of Grass.	PERA.	Per cent of Grass.	PERA.
Per cent Bracteas.	ANTHOXANTHUM	Per cent of Grass.	ANTHOXANTHUM
Per cent of Grass.	OPODOPATELLA.	Per cent of Grass.	OPODOPATELLA.

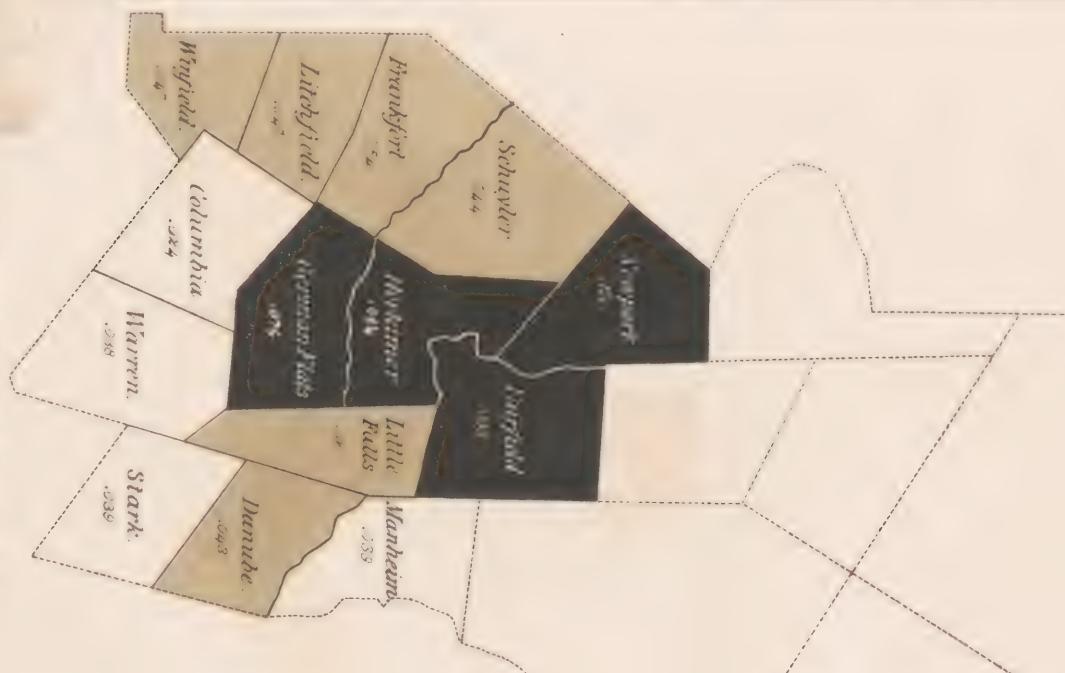
† Scarce.

UNAFFECTED WITH ERGOT.

E—Continued.

X. (1868)

White indicates Towns having less than 4 percent of Abortions
 Gray " " " between 4 and 6 percent "
 Black " " " over 6 percent "



Y. (1867)

White indicates Towns having less than 4 percent of Abortions
 Gray " " " between 4 and 6 percent "
 Black " " " over 6 percent "



Z. (see page 14.)

White indicates 0 Abortions
Green " 5 per cent or less
Red " from 5 to 10 per cent
Yellow " 10 " 25 " "
Blue " over 25 "

